DISCARD

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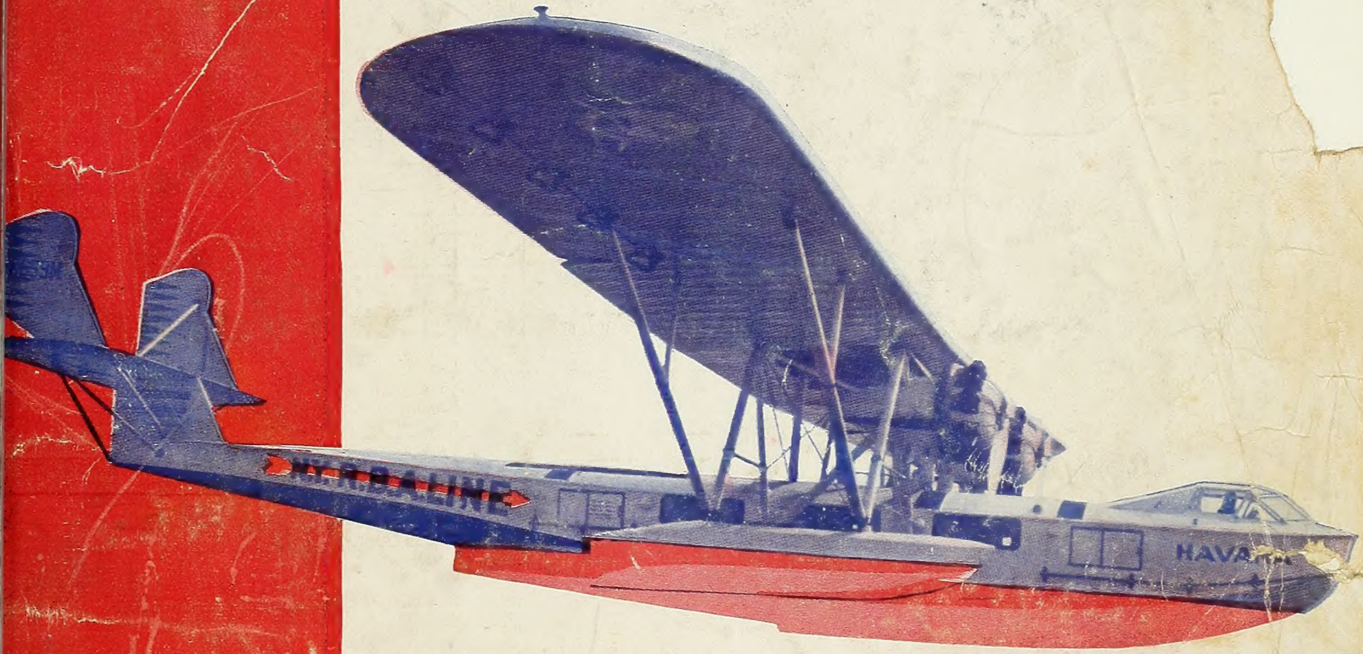
ANUARY 1930 ★ ★ 35 CENTS

HOUSTON PUBLIC
HOUSTON, TEXAS.
127

AERO DIGEST



ANNUAL EXPORT NUMBER

Herbert Hoover, Jr., begins a series of articles on Aircraft Radio

Guggenheim Fund Closes

Flying in Central Africa

Asiatic Aviation

Port	Line	Fare	SCHEDULE Lv.	SCHEDULE Ar.	RETURN Lv.	RETURN Ar.	Air Miles	Plane	Sea	Motor
ABILENE TEXAS	Central-Braniff	o.w. $ 63.00 r.t. 126.00	9:00 At Wichita 6 hrs. 3:10 OvT Okla. City	(S.D.S.) 12:33	8:50 Via Tulsa or Ovt. Okla. City	6:20 11:30	587 via O. C. 675 via Tulsa	Travel Air and Fokker F-10-A	5 6 an 1	Wasp 425 H. P. 3 Wasps 1275 H. P.
ALBUQUERQUE, N. MEX.	Western Air Express	o.w. $ 95.00 r.t. 190.00	8:30 C.T.	3:40 M.T.	12:46 M.T.	8:10 C.T.		Fokker F-10-A	1	3 Wasps 1275 H. P.
AMARILLO, TEXAS	Western Air Express	o.w. $ 60.00 r.t. 120.00	8:30 C.T.	1:40 C.T.	4:25 C.T.	8:10 C.T.		*Fokker F-10-A	1	3 Wasps 1275 H. P.
BARTLESVILLE, OKLA.	Central	o.w. $ 30.00 r.t. 60.00	9:00 At Wichita 6 hrs. 3:10	(S.D.S.) 4:10	8:00 3:10	11:30 6:30	276	Travel Air		Wasp 425 H. P.
BRECKENRIDGE, TEXAS	Central-Braniff	o.w. $ 56.00 r.t. 112.00	9:00 At Wichita 6 hrs. 3:10 OvT Okla. City	(S.D.S.) 11:45	9:40 Via Tulsa or OvT Okla. City	6:30 11:30	534 via O. C. 636 via Tulsa	Travel Air Hamilton Fairchild		Wasp 425 H. P. Wasp 425 H. P. Wasp 425 H. P.
CHICAGO, ILL.	Universal	o.w. $ 55.75 r.t. 104.50	12:18	3:33	9:45	1:50	429	Fokker F-10-A	1	3 Wasps 1275 H. P.
CLEVELAND, OHIO	Universal	o.w. $ 93.50 r.t. 175.00	12:1	7:45	2:[illegible]	6:50	749	Fokker F-10-A		3 Wasps 1275 H. P.

From Kansas City
One of America's great air-centers
go 46 routes

Port	Line	Fare	SCHEDULE Lv.	SCHEDULE Ar.	RETURN Lv.	RETURN Ar.	Air Miles	Plane	Sea	Motor
OMAHA, NEB.	Universal	o.w. $ 23.00 r.t. 43.00	10:15	12:05	1:10	3:00	166	Ryan Broughams Fokker Super Universal	4 6	Wasp 425 H. P. Wasp 425 H. P.
PEORIA, ILL.	Universal	o.w. $ 48.25 r.t. 90.25	12:25 At St. Louis 1½ hrs.	6:00	7:25 At St. Louis 2 hrs.	3:42	381	Ryan Brougham Fokker Super Universal	4 6	Wasp 425 H. P. Wasp 425 H. P.
PONCA CITY, OKLA.	Central	o.w. $ 23.50 r.t. 47.00	9:00 At Wichita 6 hrs. 3:10	(S.D.S.) 6:05	8:30	11:30	230	Travel Air	5	Wasp 425 H. P.
ST. LOUIS, MO.	Universal	o.w. $ 32.00 r.t. 60.00	12:25 3:10	2:45 5:50	7:25 11:15	10:05 3:45	235	Ryan Brougham Fokker Super Universal	4 6	Wasp 425 H. P.
ST. PAUL, MINN.	Yellow Cab Airways	o.w. $ 33.00 r.t. 66.00	9:00	1:30	9:00	1:30		Fairchild	6	Wasp 425 H. P.
SAN ANGELO, TEXAS	Central-Braniff	o.w. $ 72.50 r.t. 145.00	9:00 At Wichita 6 hrs. 3:10 OvT Okla. City or Tulsa	(S.D.S.) 1:20	8:00 Via Tulsa or OvT Okla. City	6:30 11:30	660	Travel Air Hamilton Fairchild Fokker F-10-A	5 6 6 1	Wasp 425 H. P. Wasp 425 H. P. Wasp 425 H. P. 3 Wasps 1275 H. P.
SALINA, KAS.	U. S. Airways	o.w. $ 14.00 r.t. 22.40	9:00	10:25	2:45	4:10	158	Flamingo	7	Wasp 425 H. P.
SEMINOLE, OKLA. Via S.A.F.E. Way Tulsa (S.D.S.)	Central-Braniff	o.w. $ 41.00 r.t. 82.00	9:00 At Wichita 6 hrs. 3:10 OvT Okla. City 8:10 or Tulsa 9:20	(S.D.S.)	8:40 Via Tulsa (S.D.S.)	6:10	365 via O. C. 297 via Tulsa	Travel Air Hamilton Fairchild Fokker F-10-A	5 6 6 12	Wasp 425 H. P. 3 Wasps 1275 H. P.
SPRINGFIELD, ILL.	Universal	o.w. $ 40.75 r.t. 76.25	12:25 At St. Louis 1½ hrs.	5:10	8:15 At St. Louis 2 hrs.	3:45	406	Ryan Brougham Fokker Super Universal	4 6	Wasp 425 H. P.
	Subject to change without notice. For latest information call Air Travel Bureau. HArrison 8188									
SWEETWATER, TEXAS	S.A.F.E. WAY	o.w. $ 60.00 r.t. 120.00	9:30	4:40	8:15	2:30		Ford All-Metal	11	3 Wasps 1275 H. P.
TOPEKA, KAS.	U. S. Airways	o.w. $ 7.00 r.t. 14.00	9:00	9:40	5:50	6:30	56	Travel Air	5	Wasp 425 H. P.
TULSA, OKLA.	S.A.F.E. WAY	o.w. $ 22.00 r.t. 44.00	9:30	12:00	12:30	2:50		Ford All-Metal	11	3 Wasps 1275 H. P.
TULSA, OKLA.	Central	o.w. $ 30.00 r.t. 60.00	9:00 At Wichita 6 hrs. 3:10	(S.D.S.) 6:40	7:30 1:00	11:30 6:30	315	Travel Air	5	Wasp 425 H. P.
WAYNOKA, OKLA.	Transcontinental Air Transport	For Rates Call Air Travel Bureau	3:02	6:24	8:55	11:43		Ford All-Metal	10	3 Wasps 1275 H. P.
WEWOKA, OKLA. Via S.A.F.E. Way Tulsa (S.D.S.)	Central-Braniff	o.w. $ 40.00 r.t. 80.00	9:00 At Wichita 6 hrs. 3:10 OvT Okla. City or Tulsa	(S.D.S.) 9:00	9:00 At Tulsa 6½ hrs.	6:30	297 via O. C. 385 via Tulsa	Travel Air Hamilton Fairchild Fokker F-10-A	5 6 6 12	Wasp 425 H. P. Wasp 425 H. P. Wasp 425 H. P. 3 Wasps 1275 H. P.
WICHITA, KAS.	Transcontinental Air Transport	For Rates Call Air Travel Bureau	3:02	4:56	10:10	11:43	175	Ford All-Metal	10	3 Wasps 1275 H. P.
WICHITA, KAS.	Western Air Express	o.w. $ 25.00 r.t. 50.00	8:30	10:20	6:15	8:10	175	Fokker F-10-A	12	3 Wasps 1275 H. P.
WICHITA KAS.	Central	o.w. $ 17.50 r.t. 35.00	9:00 3:10	11:00 5:00	9:30 4:30	11:30 6:30	175	Travel Air	5	Wasp 425 H. P.
WICHITA FALLS, TEXAS Via Wichita and Okla. City (S.D.S. Universal)	S.A.F.E. WAY	o.w. $ 45.00 r.t. 90.00	9:30	8:10	9:45	2:30		Ford All Metal	14	3 Wasps 425 H. P.

And every line is powered with "Wasps"

A DAY to the west lies Los Angeles. A half day to the east—Cleveland. To Dallas in 7 hours. To Chicago in 4. Here in Kansas City, where 46 routes now converge, there has developed one of the great centers of America's new transport system—the air. A glance at the combined timetables of these transport lines reveals a significant fact. Every single line leaving Kansas City is now using Pratt & Whitney "Wasp" engines.

Here is a tribute not only to the unusual reserve of flying power of "Wasps." It is a tribute to the care which the great transport companies are taking to insure the utmost of dependability in every ship that flies.

THE
PRATT & WHITNEY AIRCRAFT CO.
HARTFORD - - - CONNECTICUT
Division of United Aircraft & Transport Corporation

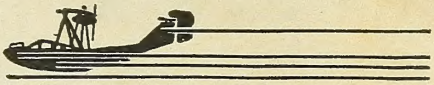
Manufactured in Canada by The Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Quebec; in Continental Europe by The Bavarian Motor Works, Munich.

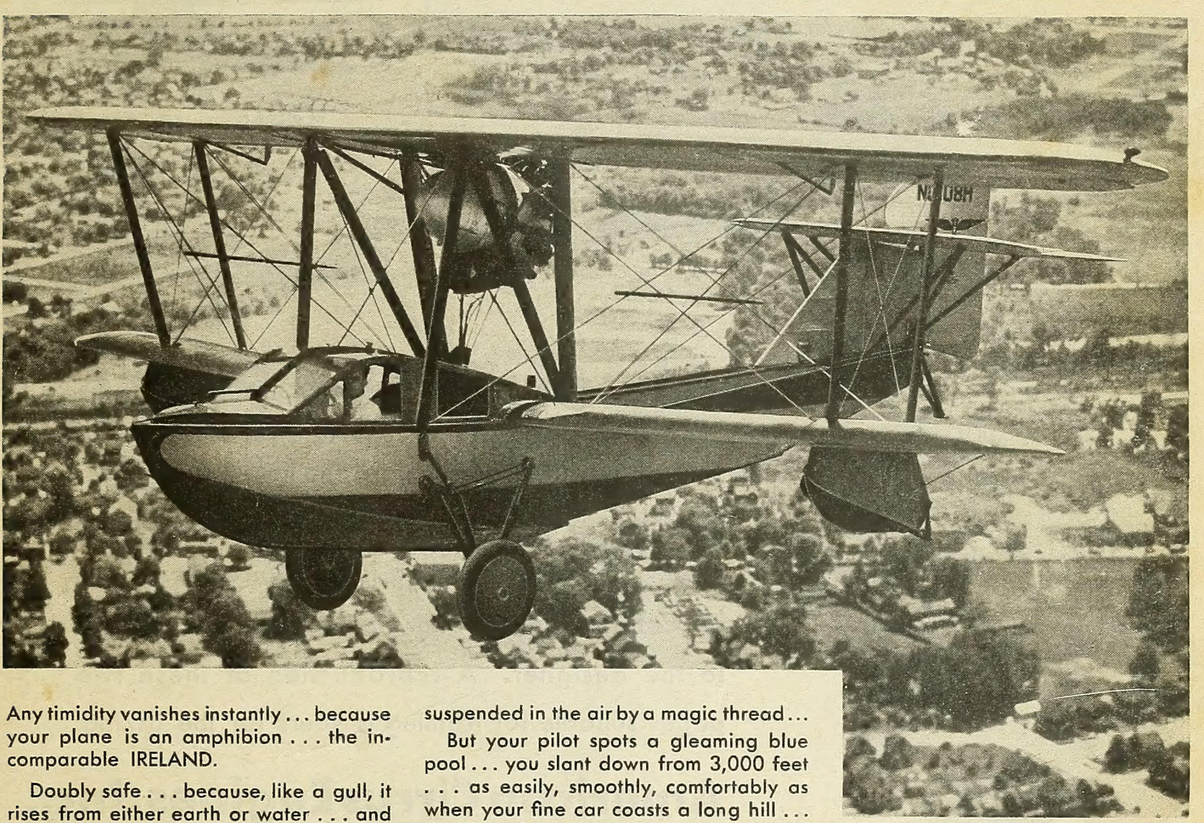
PRATT & WHITNEY, U.S.A. DEPENDABLE ENGINES

Wasp & Hornet
Engines

AERO DIGEST, January, 1930. Volume 16. Number 1.
Published monthly by Aeronautical Digest Publishing Corp. at 220 W. 42nd St., New York, N. Y. Yearly subscription $3. Entered as second class matter July 17, 1922, at the Post Office, New York, N. Y., under the Act of March 3, 1879.

First Time ALOFT!





Any timidity vanishes instantly . . . because your plane is an amphibion . . . the incomparable IRELAND.

Doubly safe . . . because, like a gull, it rises from either earth or water . . . and lands as gracefully on wave as on field.

But the super-powered Pratt-Whitney Wasp is droning . . . so you step up into a glass-enclosed cabin . . . and sink deep into buoyant cushions.

Vision forward is unobscured—for the humming Wasp is rearward; look up, as well as to right and left—for the roof is of glass.

You take off . . . leave the ground in 6 seconds . . . climb so swiftly you are up 500 feet as you pass over the fringe of the flying field . . . and 500 feet higher before you finish lighting your cigarette . . .

You look out . . . to a new world. Where your range of vision is 5 miles on land, it's 50 here! Above Long Island you can see from Sound to Ocean and three states . . . a golf course looks like an architect's model . . . automobiles crawl . . . a locomotive's smoke is a tiny, feathery plume . . . rivers are writhing serpents . . . villages and cities are the handiwork of toymakers . . .

Though your IRELAND is cleaving through space at 120 miles an hour you are conscious of no movement . . . you seem suspended in the air by a magic thread . . .

But your pilot spots a gleaming blue pool . . . you slant down from 3,000 feet . . . as easily, smoothly, comfortably as when your fine car coasts a long hill . . . the plane flattens . . . taps a wavelet lightly . . . then streaks through the water swifter than thought itself—gorgeous climax to the greatest of all life's new-born sensations.

Dizzy? Never for a moment! For in the air there are no angles or sharp perspectives.

Once up in an IRELAND all other forms of transportation seem drab, slow and obsolete. For with this marvelous amphibion you can penetrate any Eden . . . go where land planes can never go . . . and swoop down on enchanting lakes inaccessible by train or auto. Certainly you should own one of these flying marvels! For demonstration, literature and full particulars address: Ireland Aircraft, Inc., Garden City, Long Island, New York.

PERTINENT FACTS ON THE IRELAND

Performance with Full Load
Guaranteed Within 5%

High Speed	120 M.P.H.
Cruising	105 M.P.H.
Landing	48 M.P.H.
Climb	950 F.P.M.
Take-off from Water	18 Sec.
Range	450 Miles
Ceiling, Service	14,000 Feet

SPECIFICATIONS

Engine—Pratt and Whitney Wasp	425 H. P.
Length Overall	31 Feet
Span Upper Wing	40 Feet
Span Lower Wing	34 Feet
Chord	5 Ft. 6 In.
Propeller	Standard Steel
Capacity	Five Persons
Price—Flyaway at Factory	$27,500

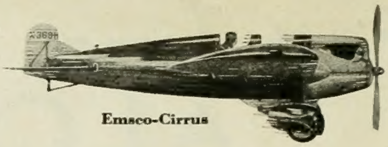
Completely equipped with Anchor, Navigation Lights, Electric Starter, etc.

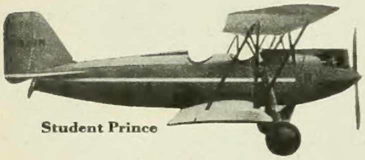
IRELAND

5-Passenger AMPHIBION

Desoutter

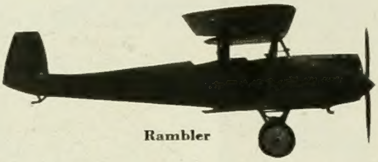
Sportsman

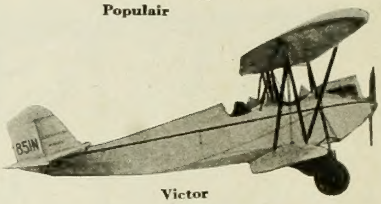

Emsco-Cirrus

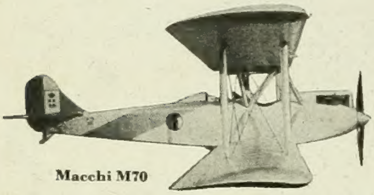

Student Prince

Baeprische B F W M-23

Populair


Rambler


Victor


Macchi M70

All of These Planes

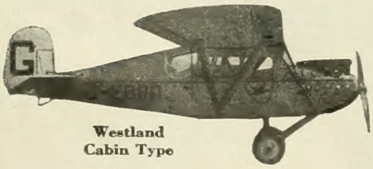
The world-wide trend toward the in-line type of engine, led by Cirrus, is evidenced by these photographs. Cowling, mounting, lubrication and servicing advantages are among the features that appeal to the designer. A reproduction of these two pages suitable for framing is yours for the asking.

American Cirrus Engines, Inc.,

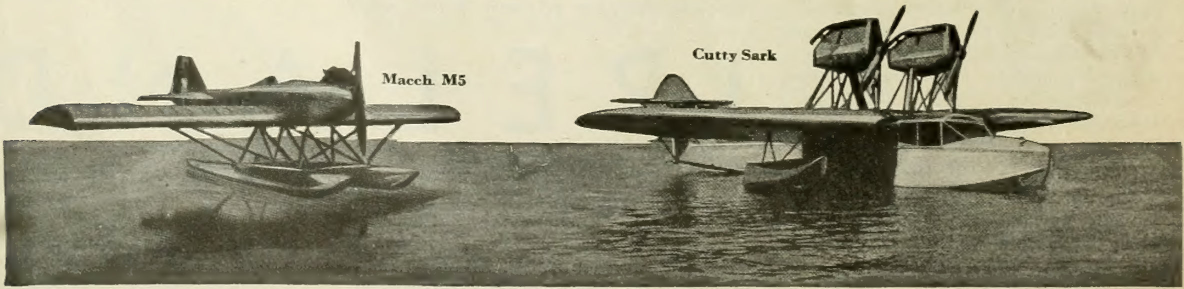
Simmonds "Spartan"

Whittelsey Avian

Ogden Osprey

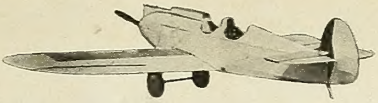

Westland Cabin Type

Westland IV Limousine

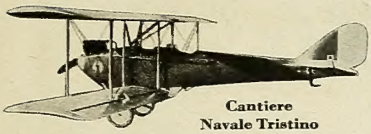

Macch. M5

Cutty Sark

Westland Widgeon


Raabkatzenstein R K 25

Great Lakes Trainer


Cantiere Navale Tristino

Piaggia Pg.

Blackburn Bluebird

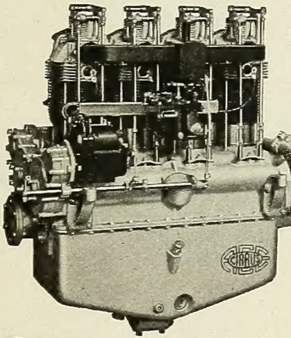
Avro Avian

Khoolhoven

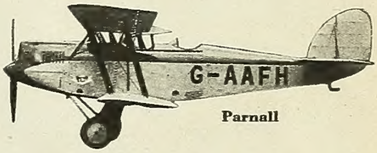
DeHavilland Moth

are CIRRUS Powered!

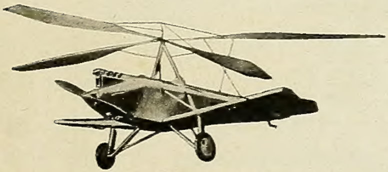
The American Cirrus Engine is the first of a growing family of American Engines. Let us work with your organization on power plant problems.

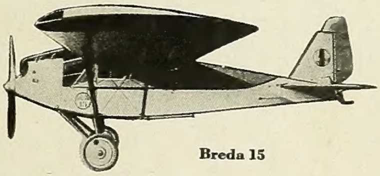

95 H. P.
273 LBS.

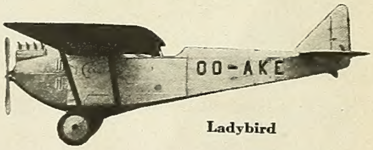
Marysville, Mich.

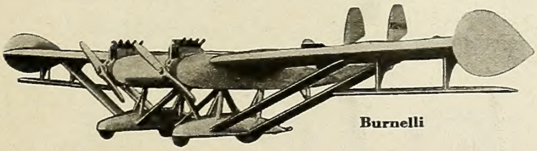

Parnall

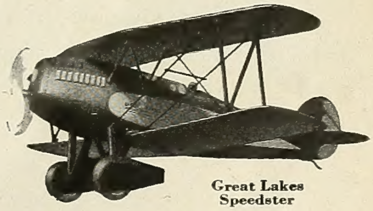
Comte Cirrus Gentleman


Cierva Auto-giro


Breda 15


Ladybird

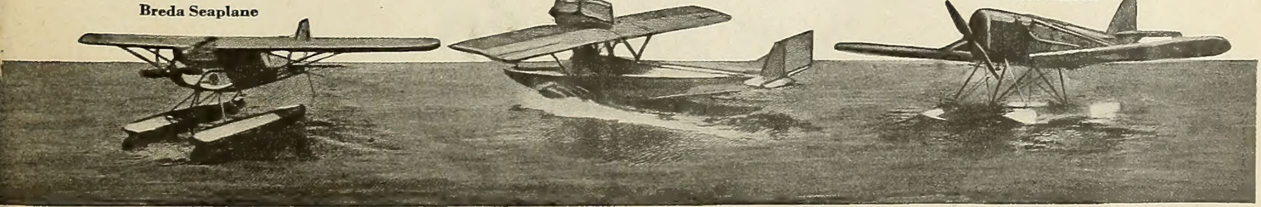

Burnelli

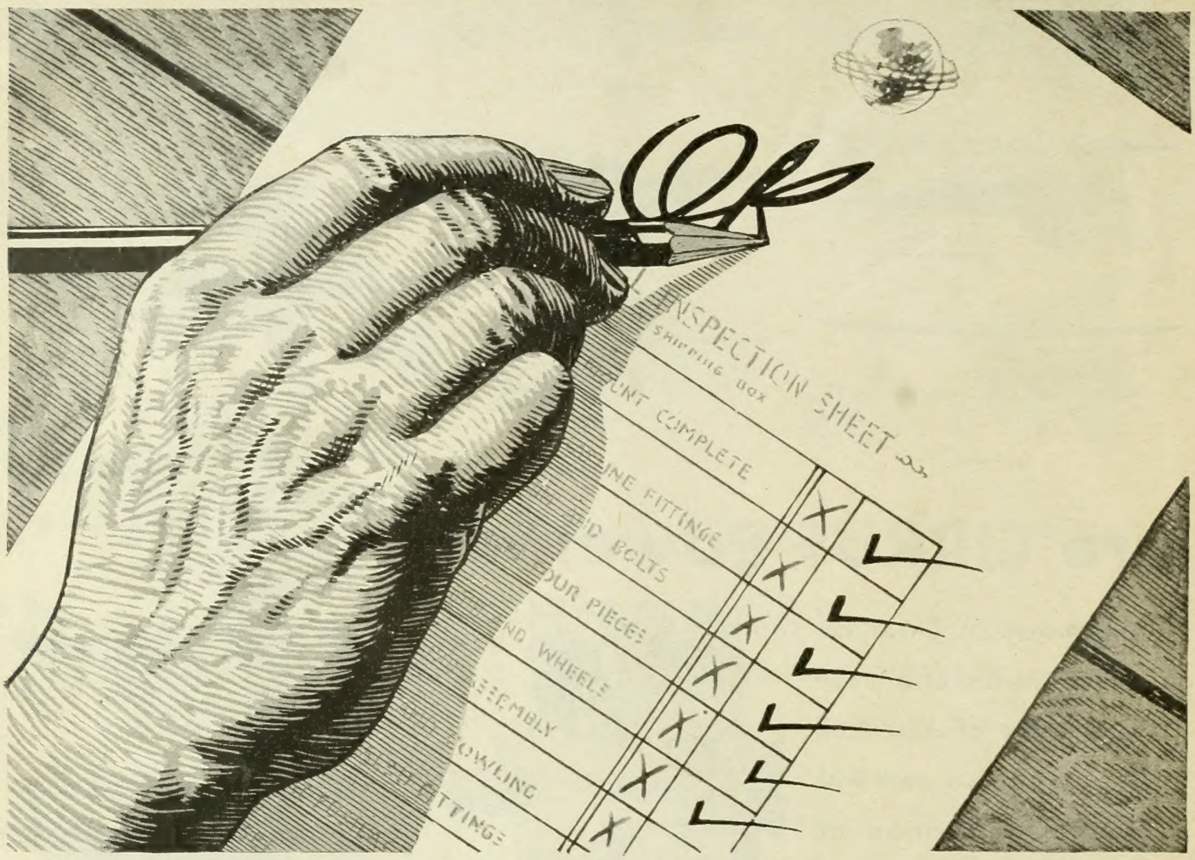

Great Lakes Speedster

Dornier Cirrus Libelle

Breda Seaplane

Short Mussel





Manila Bound!

The final O. K. has been given... inspections have been completed... the last nail is driven home in the packing case... and another Douglas plane is ready for shipment to the Philippines!

As other Douglas planes before it have done, this new Douglas plane will justify the stress Douglas lays upon perfection in craftsmanship. In a few short weeks it will soar through Oriental skies thousands of miles removed from the Douglas factory.

Here Douglas craftsmanship will again assert itself. Flying hour after flying hour will be entered in the plane's log. New motors will replace the old. But that selfsame Douglas plane will continue on, sustained by the superiority of Douglas craftsmanship, to again proclaim... Douglas Means Dependability.

DOUGLAS
AIRCRAFT CO.
INCORPORATED
Santa Monica California

This Free Book .. is for the Man who says:

"I'd like to get into AVIATION ·· *but* *I don't know how*"

"At your direction, I got in touch with the Sikorsky Company at College Point. I have connected with them and want to thank you for your help." Paul J. W. Boehn, 47 Seventh Avenue, Brooklyn, N. Y.

"I have been taking flying instructions at the Pitcairn Airport. The instruction I received from you has meant an immense saving in time and money." S. Paul Rider, 1139 Huron Av., Renovo, Pa.

IF

you are eighteen years of age or older. If you are serious enough about yourself and Aviation to train at home today for a better place tomorrow, then this book will interest you.

Walter Hinton

was pilot of the famous NC-4, the very first plane to fly the Atlantic; he was the first Aviator to fly from North to South America; he was first to use a plane for exploration. During the war he was one of the Navy's crack flying instructors. Over 400,000 miles of flight under every conceivable condition, and over thirteen years of intensive aeronautical experience are behind his method of training.

TO some men Aviation means spirals, banks, loops, a rush of wings, a roar of motors, a challenge to red-blood.

To others it means booming factories, busy air ports, expanding commerce, mounting sales, a challenge to ambition.

It does not matter WHY you are interested in Aviation—whether you think of it in terms of action in the air or action on the ground. It offers you an immediate opportunity and a big future. And Walter Hinton can help you realize both.

What is Walter Hinton's proposition? . . . It is three-fold:

First, Hinton puts you through a thorough course of training right at home, which completely covers Aviation's "groundwork." Flyers must have more than nerve and enthusiasm. Specialists in factories and at air ports need more than determination and energy. *Everybody*, in *every* branch of Aviation, needs—and *must* have—*training*.

Second, Hinton backs up his course of study with a personalized, man-to-man service. He gives you special coaching on the subjects that are of particular interest to you.

Third, he helps you capitalize your training. If you want to fly, he directs you to a properly qualified flying school, and arranges for a reduction in your tuition. If you want a job, he puts you in touch with a prospective employer. If your present occupation is not what you would like it to be—if the future possibilities of your job fail to measure up to the future possibilities within yourself—if you are EIGHTEEN years of age or older—then Hinton wants to present YOU with a copy of his book, "Wings of Opportunity."

The cost of Hinton's course and service is small. The return in dollars and opportunity is practically unlimited. What Aviation wants today above everything else is men with the *right kind* of training. Aviation will want YOU once you have *that*.

Aviation Institute of U. S. A.

WALTER HINTON, President

1115 Connecticut Avenue **WASHINGTON, D. C.**

Send to Washington

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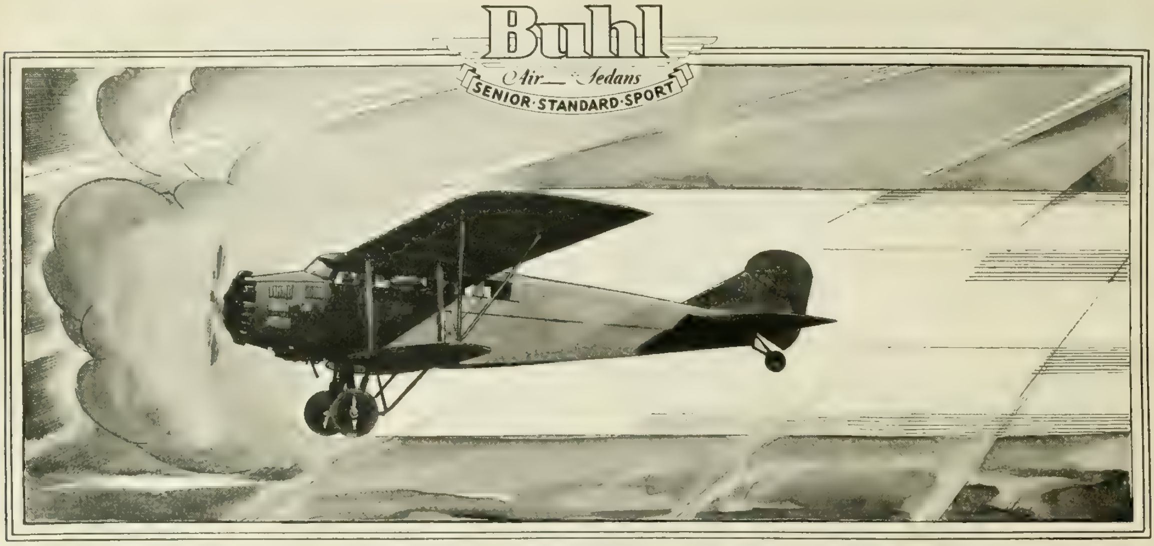
Aviation Institute of U. S. A., Walter Hinton, Pres.
1115 Connecticut Avenue, Washington, D. C.

Kindly send me a FREE copy of your book, "Wings of Opportunity." I would like to get into Aviation.

Name.. *Age*.............
(Must be 18 or over)

Street ....

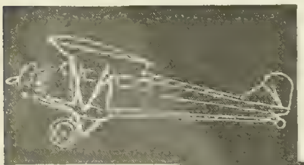
City .... *State* ....



BUHL AIRSEDAN No. CA-6-42*

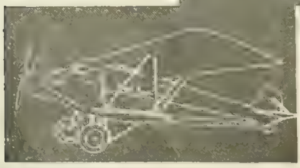
is the first to fly from Coast to Coast and back again without a stop

IN AUGUST, 1929, Nick Mamer and Art Walker hopped off from Spokane, Washington, and headed east. Storm and rain and wind and fog. Almost certain disaster and miraculous recovery. New York . . . and thousands cheer below as they refuel over Roosevelt Field . . . then head back to where the sunsets sink. Cities, plain, prairies, rivers, forests, mountains. Whistling winds and blinding fogs. Spokane! The Buhl Standard Airsedan settles gracefully on its home airport, leaving behind it a trail forever blazed across the sky . . . the first plane to successfully achieve a round trip refueling flight from coast to coast. Seventy-two hundred miles . . . over country that changed like a chameleon . . . through air conditions that were hardly a moment the same. No calm floating above an airport . . . this . . . to set a record . . . but a task to test the sternest in the men and plane. A feat that will live forever . . . the FIRST. Surely there can be no more magnificent testimonial to human courage and mechanical craftsmanship.



The Buhl Standard Airsedan is a six-place, dual control plane, powered with the new J-6 Wright Whirlwind engine.

The Buhl Sport Airsedan is a three-place plane with dual dep controls powered with either the J-5 or J-6 Wright Whirlwind engine.



The Buhl Senior Airsedan is an eight-place dual control plane, powered with a Wright Cyclone engine.

**All Buhl Airsedans are given a code number on leaving the factory. Their records are carefully tabulated and are open to your inspection at any time. Proven performance is the finest testimonial to superiority.*

BUHL
Aircraft Company
MARYSVILLE, MICH.

MAIL THIS COUPON

BUHL AIRCRAFT COMPANY, Marysville, Mich.
Gentlemen: Please send me, free of charge, your booklet "Above the Clouds."

Name ________________

Address ________________

City & State ________________

New

WITH A WEALTH OF NEW MEANINGS

AIR-SPEED indicator designed and made by the instrument engineers of Aircraft Control Corporation, a division of the Consolidated Instrument Company of America, Inc. Heretofore regarded as the delicate unit of the instrument board, it wins unstinted favor everywhere from pilot to purchasing agent by reason of its:

RUGGEDNESS

Fewer parts, each part, strengthened and all toughly unified

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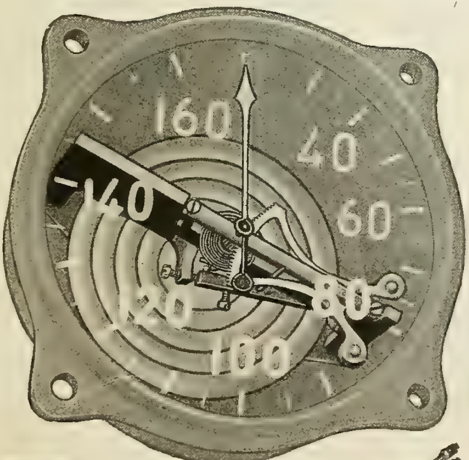

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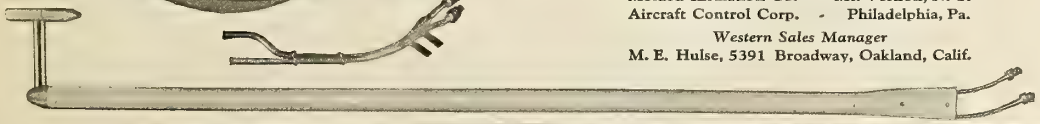

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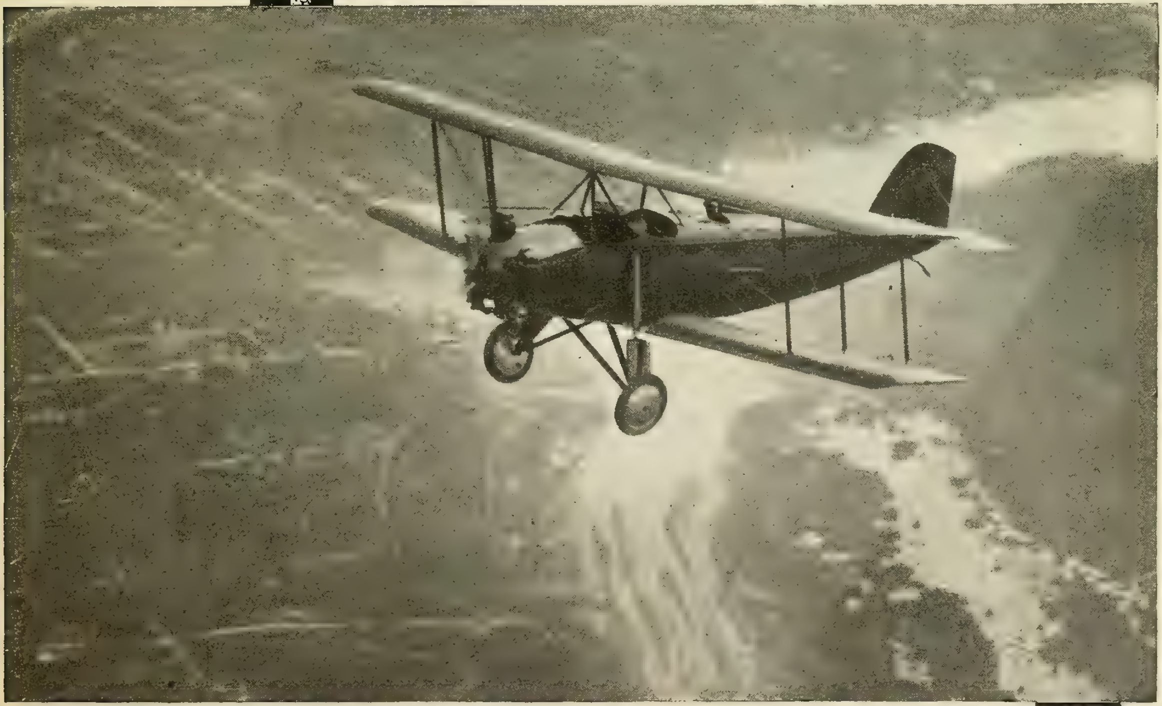

SPECIFICATIONS:

Kittyhawk Model B-4

Engine — Kinner K-5	100 H. P.	Weight empty	1107 lbs.
Approved Type Certificate No. 166		Useful load	768 lbs.
Length overall	22 ft. 11 in.	High speed	110 m. p. h.
Height overall	8 ft. 8 in.	Cruising speed	90 m. p. h.
Span both wings	28 ft.	Landing speed	38 m. p. h.
Chord both wings	4 ft. 6 in.	Climb	1200 ft. p. m.
Wing area	233.4 sq. ft.		

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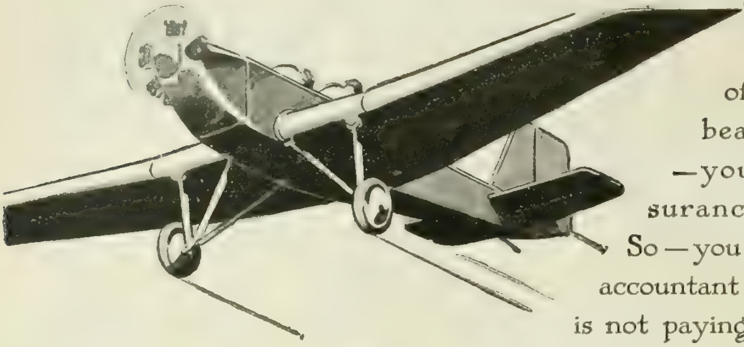

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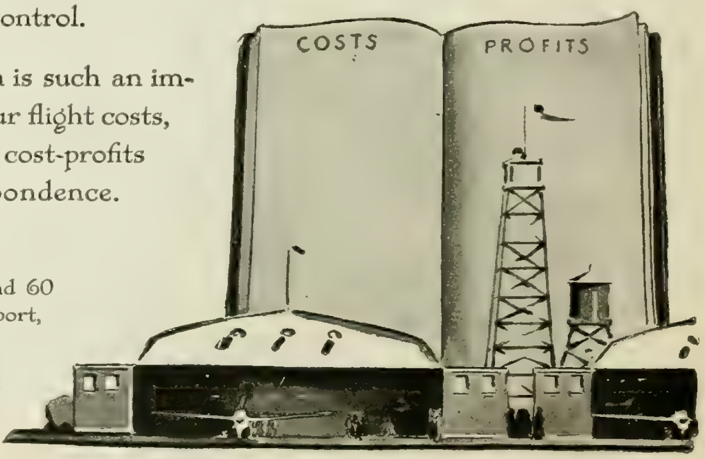

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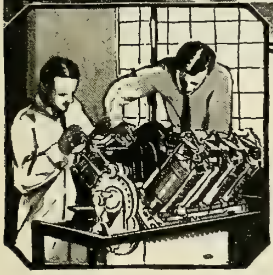

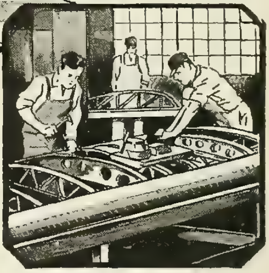

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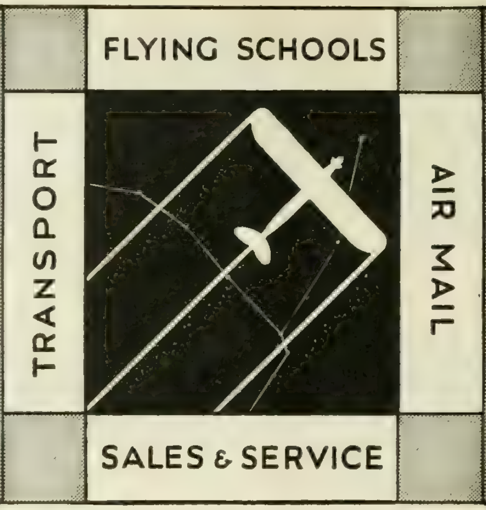

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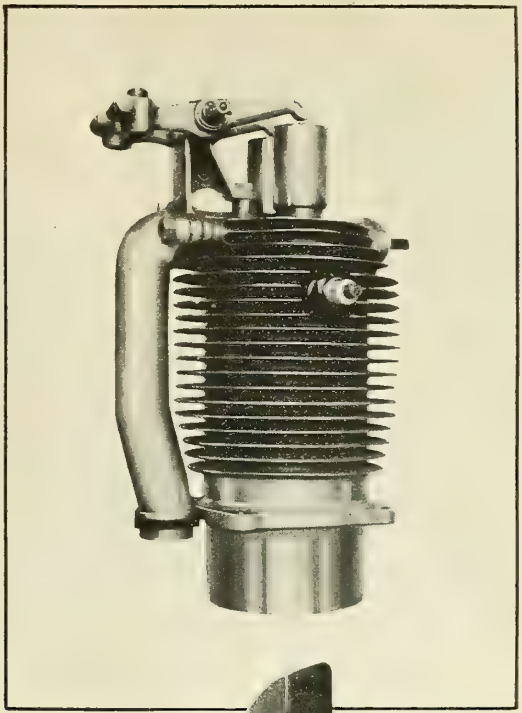

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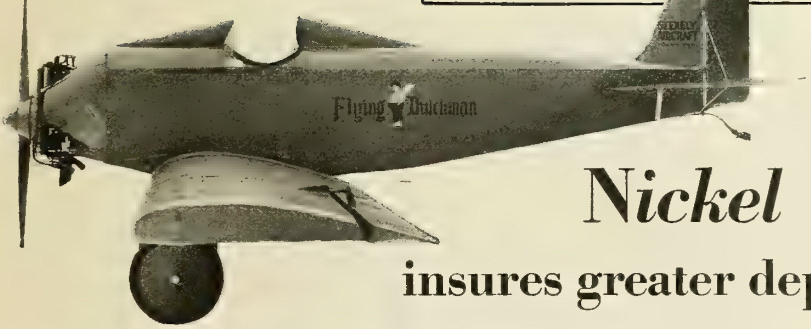
BELOW: "Flying Dutchman" monoplane with S.R.-3 engine. Plane and engine manufactured by SZEKELY AIRCRAFT & ENGINE COMPANY, Holland, Mich.



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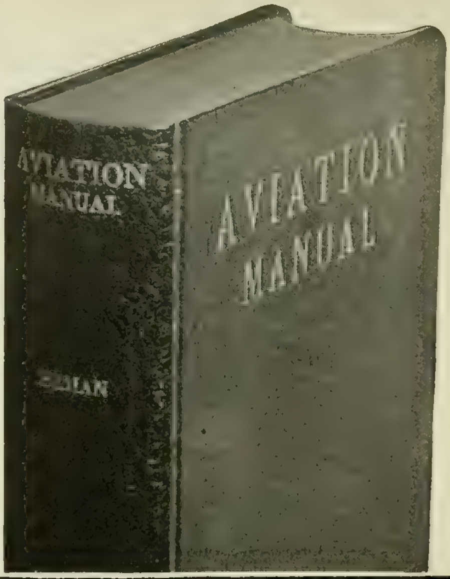

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Edited by

Lt.-Commander JOHN W. ISEMAN, U. S. N. R.

with the assistance of many famous pilots and engineers

The Aviation Manual was prepared under the editorship of Lieutenant Commander John W. Iseman, U.S.N.R., who has more than 5000 flying hours to his credit and twelve years' aviation experience, from instruction in ground school subjects at Massachusetts Institute of Technology to command of the Navy Air Station at Rockaway, N. Y. In 1920, as chief pilot of the Aeromarine West Indies Airways, he flew the first air mail from the United States to a foreign country. Many of his former students are now holding responsible positions in the aviation industry as pilots and executives. Assisting him in this undertaking were such contributors as Colonel N. J. Boots, General Superintendent of Roosevelt Field; Merwin M. Peake, instructor in the Curtiss Flying Service; G. B. Speir, Curtiss Aeronautical Engineer; J. D. Peace, Jr., specialist in aircraft instruments; Otto H. Lunde, Fairchild Engineer; Lieutenant Assen Jordanoff, veteran pilot and a noted instructor of 16 years' experience; Travis Hoke, editor of Popular Science Monthly and authority on meteorology. These and other able instructors have combined to make the AVIATION MANUAL the most authoritative and comprehensive treatment of the entire subject of modern aviation.

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Brief Outline of Contents

INTRODUCTION

PART I.
"What Is There in the Aviation Business for Me?"

Chapter 1. *Opportunities in Aviation.*
Chapter 2. *The Business of Flying.*
Chapter 3. *License Requirements.*

PART II.
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Chapter 4. *Qualifications for Flying.*
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Chapter 7. *Aviation Schools and Flying Clubs.*
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Chapter 13. *The Manufacture of Engines.*
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Chapter 14. *Instruments.*
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PART IV.
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Chapter 16. *Materials and Their Properties.*
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Chapter 21. *Advanced Flying.*
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Chapter 22. *Laying an Air Course.*
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APPENDIX

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  A glossary of aircraft and aeronautical terms.
Bibliography and References.
History of Aviation—A summary.
Classified List of Schools.
Miscellaneous Tables.

INDEX

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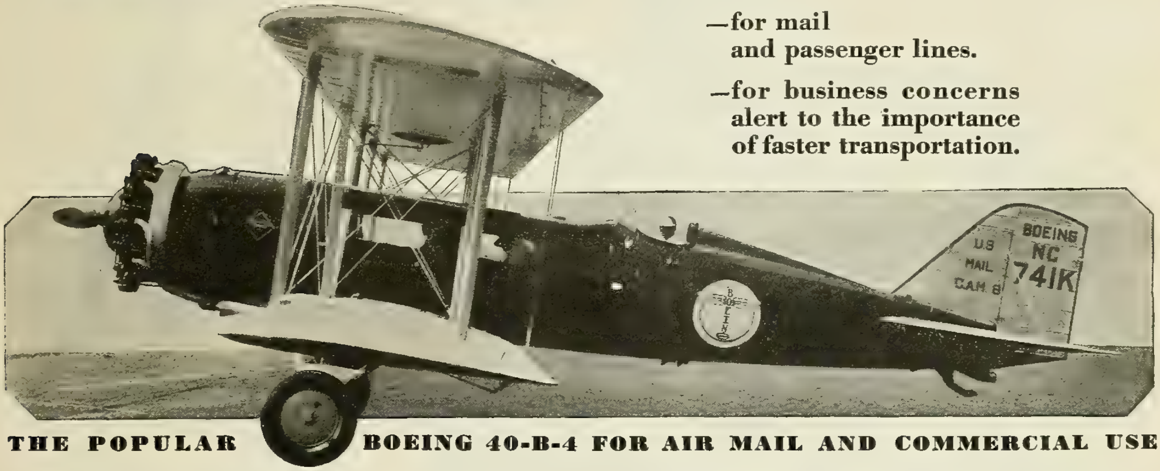

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PERFORMANCE

(Boeing Model 40-B-4 **with full load**)

Speed: High speed 138 m.p.h.; cruising speed 115 m.p.h. Ample reserve power. Cruises 4½ hrs. without refueling.

Quick Take-off; Slow Landing: Takes off in 12 seconds after 550 ft. run. Lands at 57 m.p.h.

Power Plant: 1 Pratt & Whitney 525 H. P. "Hornet" engine.

Actual Pay Load: 4 passengers, mail and baggage (1163 lbs.)

Night Flying Equipment: Instrument board lights. Parachute flares and retractable landing lights.

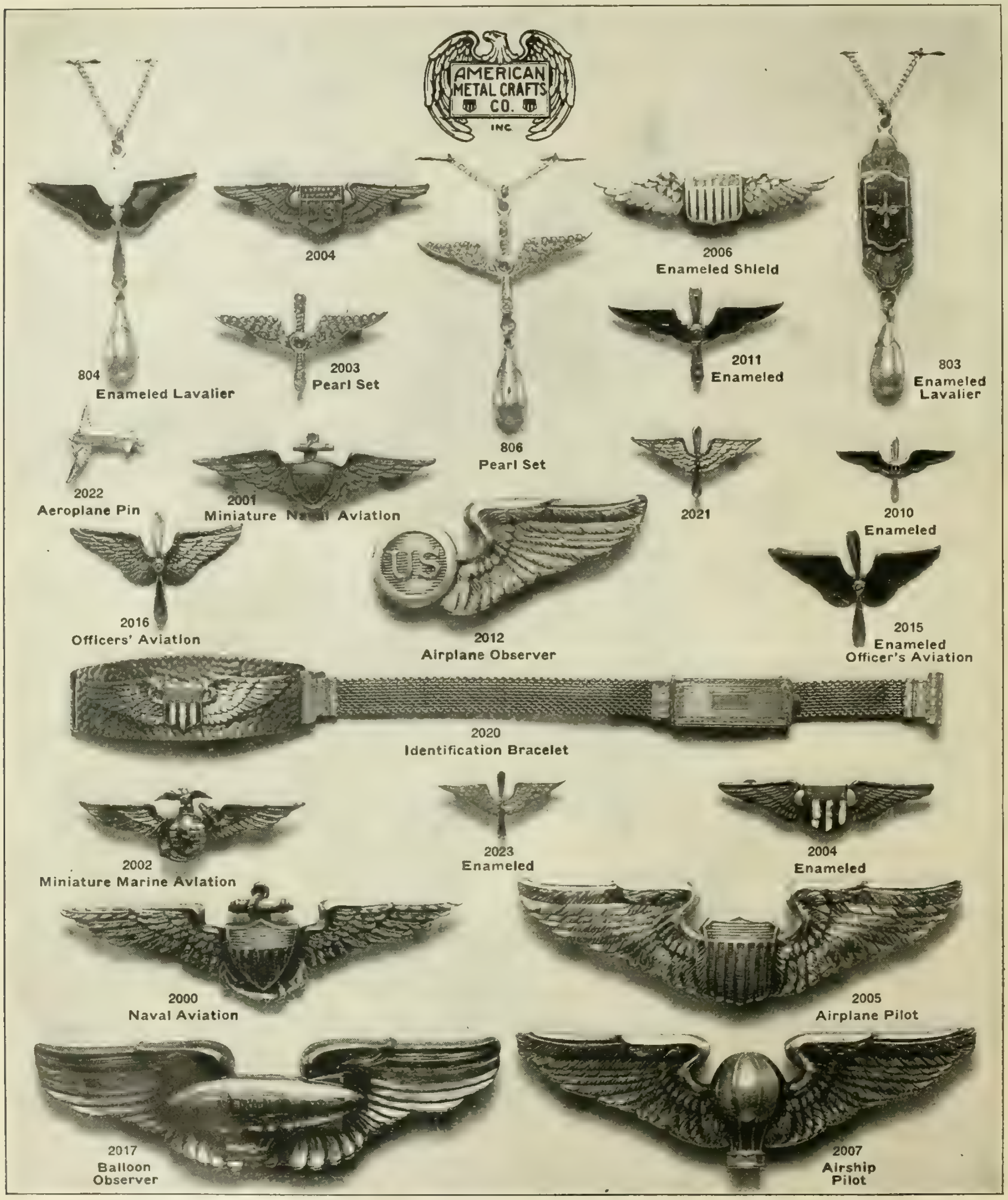
Radio Equipped: Bonded, shielded and wired throughout.

Fabric Covering: Permits speedy, economical, accurate inspection—a safety factor.

Completely Equipped: No extras to buy, no weight to add.

Special Features: Noise-proofed and insulated cabin. Oil cooler with shutter control operated from cockpit. Wheel brakes hand-operated. Adjustable pilot's seat and rudder bar pedals. Electric inertia starter.

HEADQUARTERS FOR AVIATION PINS AND NOVELTIES



This factory has specialized for years in the production of Military Insignia for the United States Army and its kindred organizations.

We have especially developed a line of Aviation Insignia, official, semi-official and gift style, such as Rings—Ladies or Gents, Pins, Pendants, etc.

We have a most complete line in beautiful enameled colorings, snappy and chic, that appeal wherever shown.

We cater, in addition to schools, to transport companies and those allied with aviation either from army, business or pleasure standpoint. We are prepared to create new designs upon receipt of specifications.

Let us know your requirements. Send for Illustrated Circular and full particulars.

AMERICAN METAL CRAFTS COMPANY

ATTLEBORO, MASS.

Manufacturers of

AVIATION INSIGNIA AND NOVELTIES

Metal Military Ornaments for the United States Army, Shooting Medals, Athletic Medals, Regimental Insignia, R. O. T. C. Metal Ornaments, Novelties mounted with Aviation and Military Insignia, Special Order Work

Not only Spectacular *...but* Consistent *also!*

By winning two consecutive National Air Tours . . . completing 122 out of 126 laps "on time" in both Tours . . . WACO's brilliant performance is* proved *consistent and reliable.

THE official records of the two stock WACOs that won the last two National Air Tours convincingly demonstrate the *practical* value which has made WACO the most popular commercial aircraft in America.

Flying on schedules timed to the second . . . covering a total of 11,200 miles in both Tours, divided into 63 laps averaging 178 miles to the lap . . . flying in all kinds of weather and over all kinds of territory . . . the two WACO entries in each Tour reported late at the control points only 4 times out of 126. And only a few minutes late, at that.

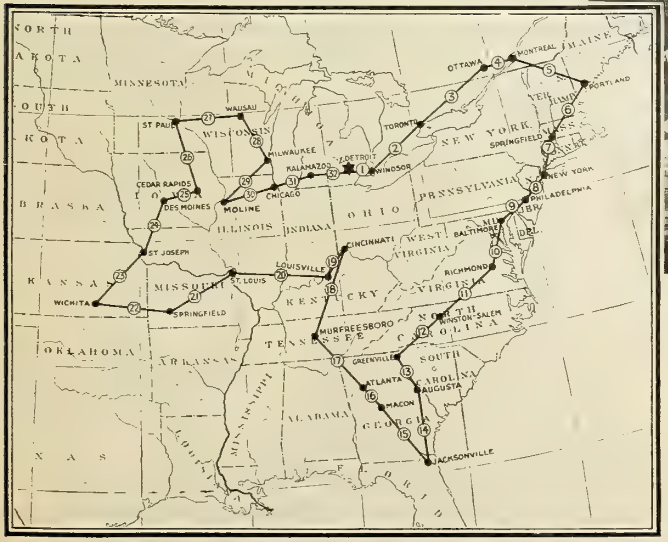
The winner of the 1929 Tour, John Livingston, had a perfect score for every lap. To do that he needed to average only 115.2 m.p.h. Actually, his average for the 5,017 miles was 130.9 m.p.h. Art Davis, in the second-place WACO, was only a trifle under Livingston's figures, averaging 128.1 m.p.h.

Comparison of the winning WACOs of 1928 and 1929 shows that the improvement in WACO airplanes is *even greater* than the general improvement in all aircraft during the year. The 1929 WACO carried *more* load . . . It flew at *higher* speed . . . It made *better* time in take-off and in landing . . . And it used a motor of *less* piston displacement. As a result, WACO won the 1929 Tour by an even more commanding margin than it had the preceding year.

At your own convenience and for your own satisfaction, find out what the WACO "225" Straight-Wing can do. Experience a bit of the remarkable performance that enabled it to win the Fifth National Air Tour by a margin of 7,178 points over the pick of the nation's aircraft. Let us arrange for your flight.

✠ ✠ ✠

Of the 29 airplanes of all sizes and prices taking off from Detroit at the start of the 16-day Tour, 24 finished . . . a real tribute to the dependable performance of present-day aircraft and engines.



Map of the 5,000 mile course and the 32 control points in the Fifth National Air Tour of 1929

The Ford Reliability Trophy and its 1929 winner. John Livingston. Read his own impressions of the Tour and the remarkable performance of his ship. And ask for the new booklet that describes the WACO "225" Straight-Wing.

THE WACO AIRCRAFT COMPANY
TROY, OHIO

WACO
AIRPLANES

9-46

"Ask Any Pilot"

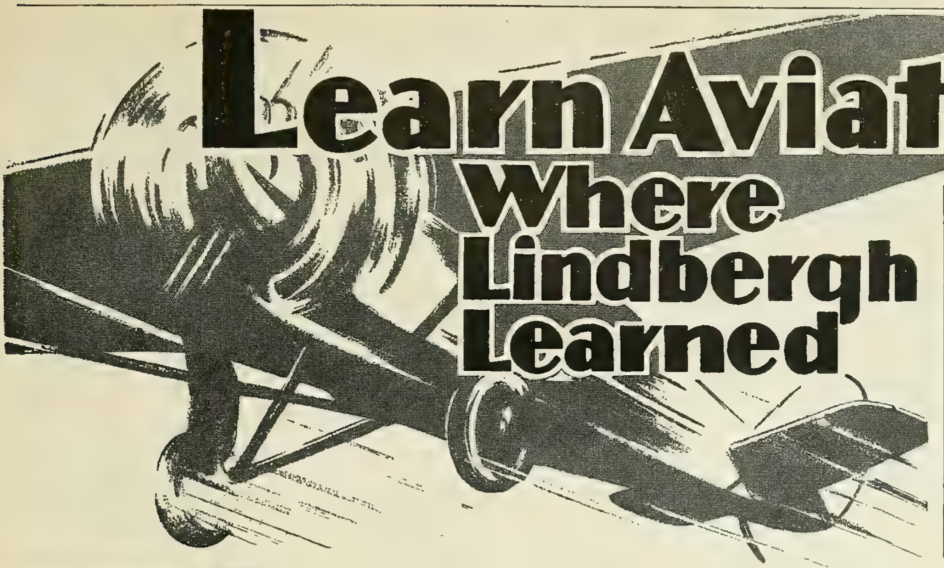
"I'll be there in an hour"

IN air travel · · · · whether for business or pleasure · · · · distance is measured by hours and minutes, not by miles. Two points may be more than one hundred miles apart on the map, but separated by less than an hour of easy flight · · · · depending on the pilot's fancy for great or casual speed.

- The business man or sportsman will find that a Spartan meets his every requirement for a private plane . . . . a means by which to avoid congestion of land travel · · · · and crowd more hours into a day.
- A Spartan is distinctively trim and racy in appearance, excellent in finish, yet a hand-made plane of flawless material and sturdy qualities of construction. It is always dependable because is is amply powered for quick take-off, or high speed in flight · · · · and it lands as safely on the small, private field as on the airport.
- Spartan airplanes have two inherent safety factors. 1—A Spartan will not spin accidentally · · · it must be forced. 2—Its design insures natural, level, straightaway flight. And its smooth response to control has distinguished it as a plane extremely easy to fly.

Write for folder describing the Spartan C-3-165 powered by the Wright "Whirlwind Five" (A. T. C. No. 195). Standard equipment includes dual controls, metal propeller, booster magneto, gasoline gauge, air speed indicator, oleo gear, Bendix wheels and brakes, adjustable stabilizer, navigation lights . . . . $5975 fly away Tulsa

SPARTAN AIRCRAFT COMPANY • TULSA, OKLA.

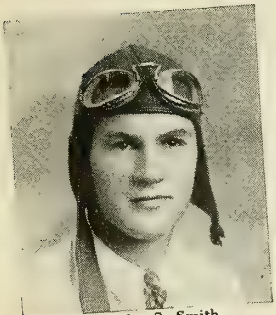


Learn Aviation Where Lindbergh Learned

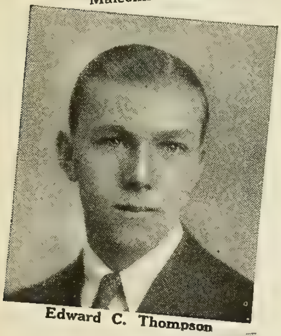
"Lindy" Took First Training at Lincoln

In his book, "WE", Lindbergh tells about his early training days at Lincoln. Here is an extract:

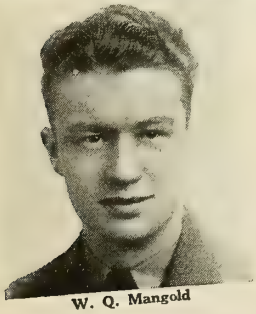
"On April 9, 1922, I had my first flight as a passenger in a Lincoln Standard with Otto Timm piloting. The next two months were spent in obtaining my flying instruction and in learning what I could around the factory as there was no ground school in connection with the flying course at that time."



Malcolm S. Smith



Edward C. Thompson



W. Q. Mangold

Quick Success for Lincoln Graduates—Read Their Letters!

THEY'RE making good—are Lincoln graduates! Some pilot great ships down the roaring skyways. Others put planes in dependable shape for distant journeys. Still others—working on craft unborn—are making them staunch, dependable and safe. In the air or on the ground—Lincoln training tells! It's thorough, complete, entirely practical. It assures success. At the left see photos of 3 Lincoln-trained men who are making good. Their letters—only a few of the many we receive—praise this school. Read them below!

Demonstrates Planes

"Thanks to your capable instruction, I have secured a position with an aircraft factory at Lincoln, demonstrating planes. This position pays me a good salary. It also enables me to build up my required hours for a transport license at no expense to myself. I attribute my success thus far very largely to your school."—Malcolm S. Smith.

Substantial Salary

"Desirous of getting into the airplane industry, I traveled over half the United States investigating flying schools and airplane factories.

"I finally selected the Lincoln Airplane and Flying School. I am glad I did. For after completing the prescribed course of training, I had no difficulty in landing a good position in one of Lincoln's aircraft factories, where I have worked for several months, receiving a substantial salary to start and with the assurance of promotion in the future. You have the best equipped ground school and give the most careful and thorough training of any school within my knowledge."—W. Q. Mangold.

Job in 4 Days

"I found all Lincoln instructors most courteous and most willing to give me every help. I most heartily recommend your school.

"After completing my mechanics and ground work June 20th, I started to work as an airplane mechanic at the Worcester Airport here at East Douglas, Massachusetts, June 24th."—Edw. C. Thompson.

Complete Courses —Come to the Lincoln School. Get complete, practical training as ground man or pilot. We train you for all Dept. of Commerce Licenses. Over $250,000.00 worth of buildings and equipment, with large production airplane factory in connection. Expert instructors. You disassemble and assemble actual ships and motors. You go right up into the sky. Planes and pilot and airplane mechanic instructors carry the Dept. of Commerce License. Mail Coupon for complete information!

FREE Aviation Book

Get our FREE new book, "Aviation Beckons You." Contains full information about Lincoln School. Tells story of "Lindy" at Lincoln. Chock full of interesting aviation facts and photos. Tells about Big-Money opportunities in Aviation. Mail Coupon—NOW!

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AIRPLANE AND FLYING SCHOOL

393 Aircraft Bldg. Lincoln, Nebr.

MAIL THIS COUPON

LINCOLN AIRPLANE SCHOOL
393 Aircraft Bldg., Lincoln, Nebr.

Dear Sirs: Please send me FREE Book, "Aviation Beckons You," including the story of Lindbergh at Lincoln, Low Tuition, etc.

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City........................... State.................

Page—AERO DIGEST No. 5348

ANNOUNCEMENT

Announcement is made of the consolidation of the Hamilton Aero Manufacturing Company of Milwaukee and the Standard Steel Propeller Corporation of Pittsburgh. The name of the new company, which is a subsidiary of the United Aircraft & Transport Corporation, is the Hamilton Standard Propeller Corporation. Mr. Thomas F. Hamilton is Chairman of the Board of the new company, Mr. Harry A. Kraeling is President and Eugene E. Wilson, formerly Commander U. S. N., Vice President.

★ ★ ★

AN immediate development resulting from this consolidation is the enlargement of the engineering and research departments of the amalgamated companies. In addition to the new plant and other modern facilities at Pittsburgh full use will be made of available speed courses and testing facilities at Milwaukee and Los Angeles to improve the performance of existing designs and develop new types. The Hamilton Standard engineering staff offers complete cooperation with manufacturers in the study and solution of their specific problems.

The consolidated organization also makes possible more complete and rapid service. A modern factory branch and service station has been established at Los Angeles where ample propeller stocks are carried for prompt delivery. Complete heat treating and straightening equipment is being installed to facilitate repair work which will be carried on under expert supervision. Additional branches will be established at strategic points.

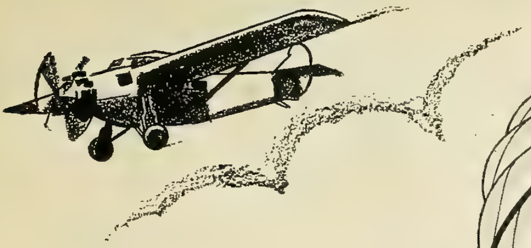
For the present, prices will continue in accordance with the price list issued by the Standard Steel Propeller Corporation in January, 1929. Work is now being carried forward on the practical problem of allocating production between various factories. Should manufacturing economies be effected, it will be the policy of this company to reflect such economies by price reduction to the industry.

HAMILTON STANDARD PROPELLER CORPORATION

Division of the

UNITED AIRCRAFT AND TRANSPORT CORPORATION

PITTSBURGH · · MILWAUKEE · · LOS ANGELES



12 CONTINUING SUSPENSION CORDS—

No knots — No splices —

provide* IRVINS *with an extra margin of safety

THE shroud lines on an Irvin Air Chute are continuous from their points of attachment on both sides of the harness, providing twenty-four powerful supports to carry the passenger safely to earth.

They are free from knots or splices, and are made of specially selected silk of 400 pounds tensile strength. Passing completely over the top of the chute, these cords form a strong network which assures an extra margin of safety.

Actual tests have proved that an Irvin Chute withstands the shock of a 600 pound load when released at 100 miles per hour . . . or a 200 pound load when released at a speed of 400 miles per hour!

Irvin Air Chutes are available in all sections of the country. Among the important distributors are Curtiss-Wright Flying Service, Colonial Flying Service, Air Associates, Inc., Nicholas-Beazley Airplane Company, Cleveland Institute of Aviation, Cleveland, Ohio; Pittsburgh Aircraft Agency Corporation, Pittsburgh, Pa.; Ludington Philadelphia Flying Service, Philadelphia, Pa.; Motor Equipment Company, Wichita, Kan.; Walter M. Murphy Co., Los Angeles, Cal.; Aero Corporation of California, Los Angeles, Cal.; and Southern Equipment Co., San Antonio, Texas.

Dealers who are interested should communicate directly with the company. If there are no dealers near you, write to us and we will arrange the most convenient way to supply your needs.

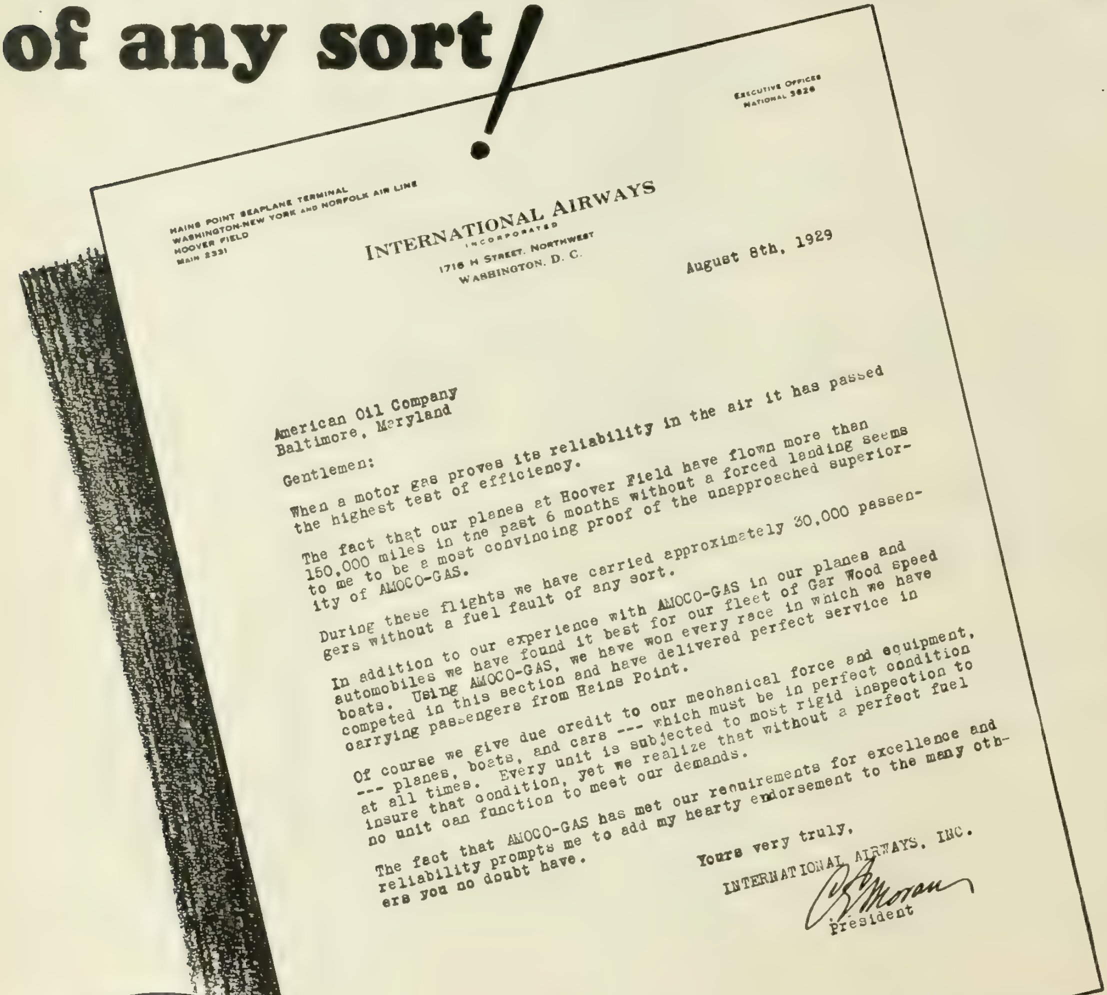
IRVIN *The Life Preserver of the AIR*

IRVING AIR CHUTE CO., INC., 372 PEARL STREET, BUFFALO, N. Y.

And you glide gently to earth for a Happy Landing!

Our Motion Picture "Happy Landings" on standard width film, illustrating actual operation of the Irvin Air Chute is available free of charge to schools, clubs and organizations interested in aviation. Send for booklet and particulars.

Not a forced landing in 6 months . . . Not a fuel fault of any sort!



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HOOVER FIELD
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INTERNATIONAL AIRWAYS
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EXECUTIVE OFFICES
NATIONAL 3626

August 8th, 1929

American Oil Company
Baltimore, Maryland

Gentlemen:

When a motor gas proves its reliability in the air it has passed the highest test of efficiency.

The fact that our planes at Hoover Field have flown more than 150,000 miles in the past 6 months without a forced landing seems to me to be a most convincing proof of the unapproached superiority of AMOCO-GAS.

During these flights we have carried approximately 30,000 passengers without a fuel fault of any sort.

In addition to our experience with AMOCO-GAS in our planes and automobiles we have found it best for our fleet of Gar Wood speed boats. Using AMOCO-GAS, we have won every race in which we have competed in this section and have delivered perfect service in carrying passengers from Hains Point.

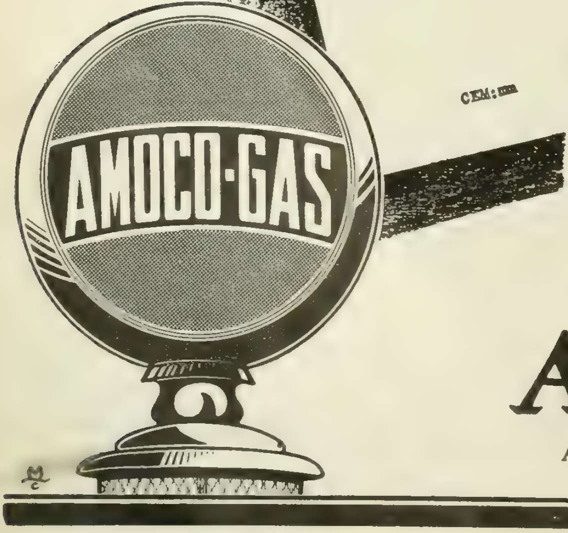
Of course we give due credit to our mechanical force and equipment, --- planes, boats, and cars --- which must be in perfect condition at all times. Every unit is subjected to most rigid inspection to insure that condition, yet we realize that without a perfect fuel no unit can function to meet our demands.

The fact that AMOCO-GAS has met our requirements for excellence and reliability prompts me to add my hearty endorsement to the many others you no doubt have.

Yours very truly,

INTERNATIONAL AIRWAYS, INC.
C E Moran
President

CEM:mm



International Airways Inc. *made this fine showing with* AMOCO-GAS

AMERICAN OIL COMPANY, *General Offices:* Baltimore, Md.
Affiliated with Pan American Petroleum & Transport Company

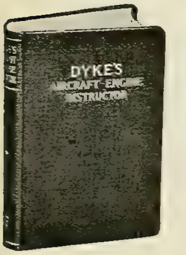
The Big 3 for AIR MINDED ambitious MEN

Depend on WILLCOX AVIATION BOOKS

AIRCRAFT ENGINE INSTRUCTOR

NEW EDITION
Oct., 1929

By A. L. Dyke



Engineers from some of the best known companies assisted Mr. Dyke in the preparation of this great book, which covers modern aircraft engines and miscellaneous accessories and equipment, such as carburetors, magnetos, starters, generators, aeronautic instruments, etc. Adequate space is devoted to the Wright "Whirlwind," the "Wasp," Curtiss, Packard, Fairchild-Caminez (engine without crankshaft or connecting rods) and other leading engines, including some well known foreign makes. A very complete discussion of the Curtiss OX-5 engine with engine trouble-shooting charts included. Right up-to-date, including the construction and maintenance of metal (and wood) propellers, principle of operation of superchargers and rotary induction, discussions and illustrations of the "Cyclone," "Hornet," "Chieftain," "Challenger," Warner, Velie, Anzani, etc.

Practical, usable information is given on inspection for worn parts and locating troubles and what to do to correct or repair them.

The Aircraft Engine Instructor is more than a book—it's a complete training on aircraft engine construction, maintenance and operation; an indispensable source of ready information for the mechanic and pilot alike.

Contains 430 *pages and over* 400 *illustrations,* including folding colored inserts and master charts. It's the book of the hour.

Size 6½ x 9½

Sent postpaid $5.00

AIR NAVIGATION *and* METEOROLOGY

By Capt. R. Duncan

Licensed Pilot U. S., Canada, France, England

3d EDITION
May, 1929

Here is a book that contains the exact information needed by a flier to become an efficient air navigator. To study the book and make the widest possible use of it, requires only the ability to read, write and use common sense.

The entire subject is presented in a simple, non-technical way without the use of mathematical problems. It explains the meaning of all technical words and terms and deals with maps and charts in a way that the reader cannot fail to understand. The principles of air navigation, weather forecasting, magnetism and magnetic poles, are thoroughly explained before taking up the practical side of flying and the use of flying instruments.

Other sections of the book cover the airplane compass and all instruments used in air navigation, such as the Air Speed Indicator—Altimeter—Course and Drift Indicator—and others.

Complete instructions are given for calculating magnetic variations, deviations, effect of wind on plane in flight (drift), and other problems of air navigation. Night flying, night flying equipment.

Over 250 pages, 70 illustrations. Flexible binding.

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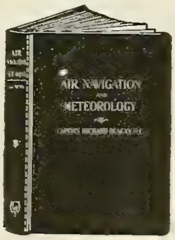

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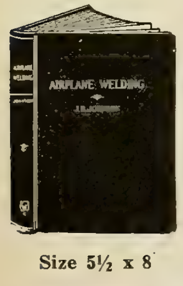
AIRCRAFT WELDING

PUBLISHED
Oct., 1929

By J. B. Johnson, M. E.



Between the covers of this timely book is packed every fact and every bit of information available today on the art of welding in aircraft design, construction and repair. It covers every method of welding—every type of weld—every weldable metal—in plain, every-day language. It shows how welding enters into aircraft design—how ships are fabricated and built with welds—how repairs are made, and best of all—it shows you how to make all the different kinds of welds and how not to make them, too, so you can't go wrong. The author has had a wide experience in actually doing and supervising the kind of work which he describes so well for you in his book. He has conducted experiments and made thousands of tests of various kinds. He has trained many men in the art of Aircraft Welding, and is considered everywhere a real authority on the subject.

There is nothing academic or with the schoolroom flavor in the material he gives you. He talks right from the shoulder in the language of the shops. His book is easy to read and easy to understand. You get every point he brings out, not only easily and quickly, but in a way so you will never forget it.

Over 320 pages, 210 illustrations. Flexible binding.

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In the Air—On the Ground—In the Shop—If you've got a spark of the "air urge" in your make-up—*get acquainted with Willcox Aviation Books.*

Here are three new books, just as up-to-date as the latest record flight and just as practical as practical, experienced writers can make them.

They are simplified, well illustrated, finely printed, durably bound—and downright important to your air success. Published for men who want the latest authentic information, without the need for deep and lengthy study. They give you what you want and what you need and give it to you quick. They are sold and guaranteed to be the best books on the subject, and you are the judge, because you get your money back on your own "say-so" if they fail to please.

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SPEED-POWER-STABILITY-*and more of it!*

As Revolutionary in Flight As In Design

Wherever an Invincible lands,—there the curious gather. At last a plane that looks different! "See how she lands,—how three passengers with luggage emerge from a compact cabin,—note the wings placed in perfect alignment with the center of the propeller thrust!"

As positively as a straight arrow travels faster than one that is bent, does the Center-Wing Invincible outspeed any other wing design of equal power. Racy lines, beautiful streamlining and minimum resistance further amplify the power result of 170 h.p. Curtiss Challenger engines.

Fly her hands off and see how she steadies herself. Maximum safety plus luxurious accommodations give the business flyer every desired asset. Details upon request.

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INVINCIBLE

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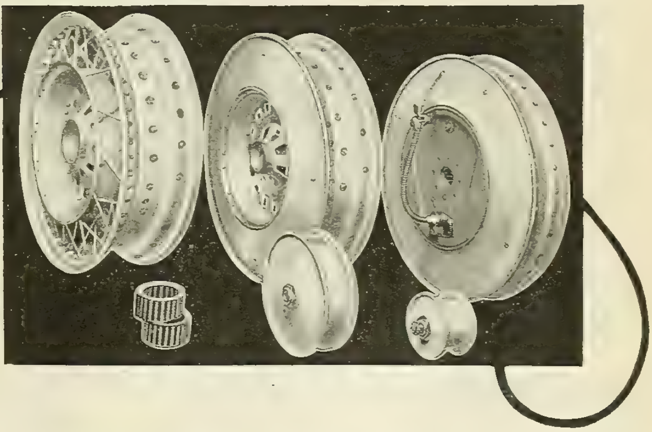
Your Logical Source of Supply . . .



The Aircraft Products Corporation is unquestionably your logical source of supply for standard aircraft parts. Our engineering staff composed of specialists whose reputations place them among the leading authorities in their particular phase of aircraft design, are always available to you . . . our manufacturing facilities, geared for straight line mass production, and our remarkably low selling expense, due to our widely diversified line of products, are solving cost problems for many of America's leading aircraft producers. You, too, can benefit through the experience of our engineers and the economies of this mass production. Write today . . . we solicit your inquiries on standard or special aircraft parts.

Our manufacturing methods and the volume of our business permits a greater degree of accuracy, and finer workmanship, at a price per unit considerably below the production costs on like products manufactured by individual aircraft producers.

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Designers and Manufacturers of Airplane Wheels and Brakes, Axles and Complete Undercarriages, Oildraulic Shock Struts, Tail Wheel Assemblies, Airplane Skis, Flying Boat Hulls, Pontoons, Wing Tip Floats, Airplane Parts and Special Fittings.

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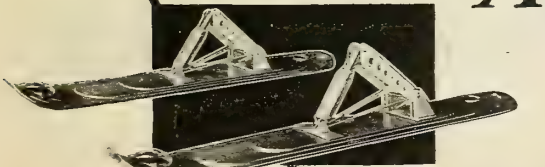

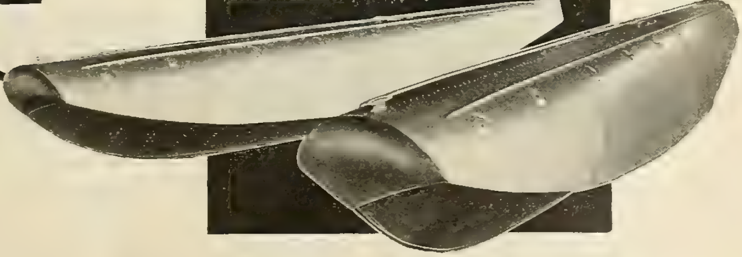

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STABILITY is the crying need of the aircraft industry today . . . confidence that its sources of supply will be in business tomorrow and the day after tomorrow . . . that they will continue to serve on the sound, sane basis that meets all requirements with promptness, economy and certitude. The Buhl Stamping Company offers the builders of aircraft and aircraft engines the fruit of forty years experience in the production of metal stampings . . . plus a complete producing unit devoted exclusively to the needs of this business in the air.

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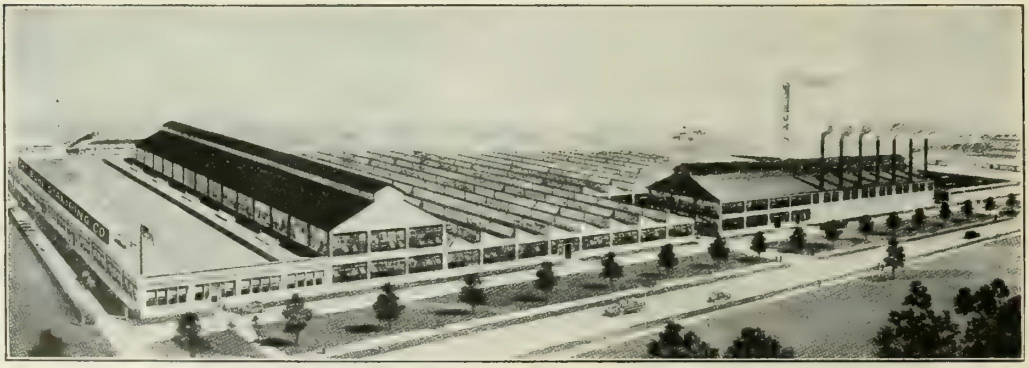

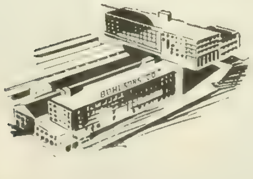

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DETROIT

BUHL ***STAMPING COMPANY***
DETROIT, MICHIGAN

THE BUHL NAME has been identified with progressive industry since 1833. Buhl products today carry far more than the name alone—they preserve the priceless heritage of almost a century of manufacturing leadership and integrity.

A group of Airport Surveys and Reports by Austin.

Airport Engineering Experience

THERE is no satisfactory substitute for experience in an airport project. Like "flying hours", you either have them or you don't have them.

The extremely complicated set of factors that enter into the selection of a site, layout, design and construction of a respectable airport, call for specialized experience of a sort that is extremely rare in this new industry.

Austin's work for the aviation industry commenced long before the country began to go "air-minded". A complete Airport Division, manned by men of wide experience in airport engineering and construction, is working on strictly aviation projects, widely diversified, through the company's seventeen district offices from Coast to Coast.

Airport Surveys and Reports, as illustrated above, including site selection, constitute a large part of Austin's work, for no airport project worthy of the name should be undertaken without such a complete study of the situation. The large investment represented by an airport, whether large or small, demands such protection.

In nearly fifty cities, in almost every section of the country, Austin has served prominent air line operators, aircraft manufacturers, municipalities and other interests . . . with airport surveys and reports, and with design and construction of airports, hangars and aircraft factories.

For information and approximate costs, phone the nearest Austin office, wire or send the memo below.

THE AUSTIN COMPANY

Airport Engineers and Builders ✈ Cleveland

New York Chicago Philadelphia Newark Detroit Cincinnati Pittsburgh St. Louis Seattle
Portland Phoenix The Austin Company of California: Los Angeles, Oakland and San Francisco
The Austin Company of Texas: Dallas The Austin Company of Canada, Limited

THE AUSTIN METHOD

USE THE AIR SERVICE

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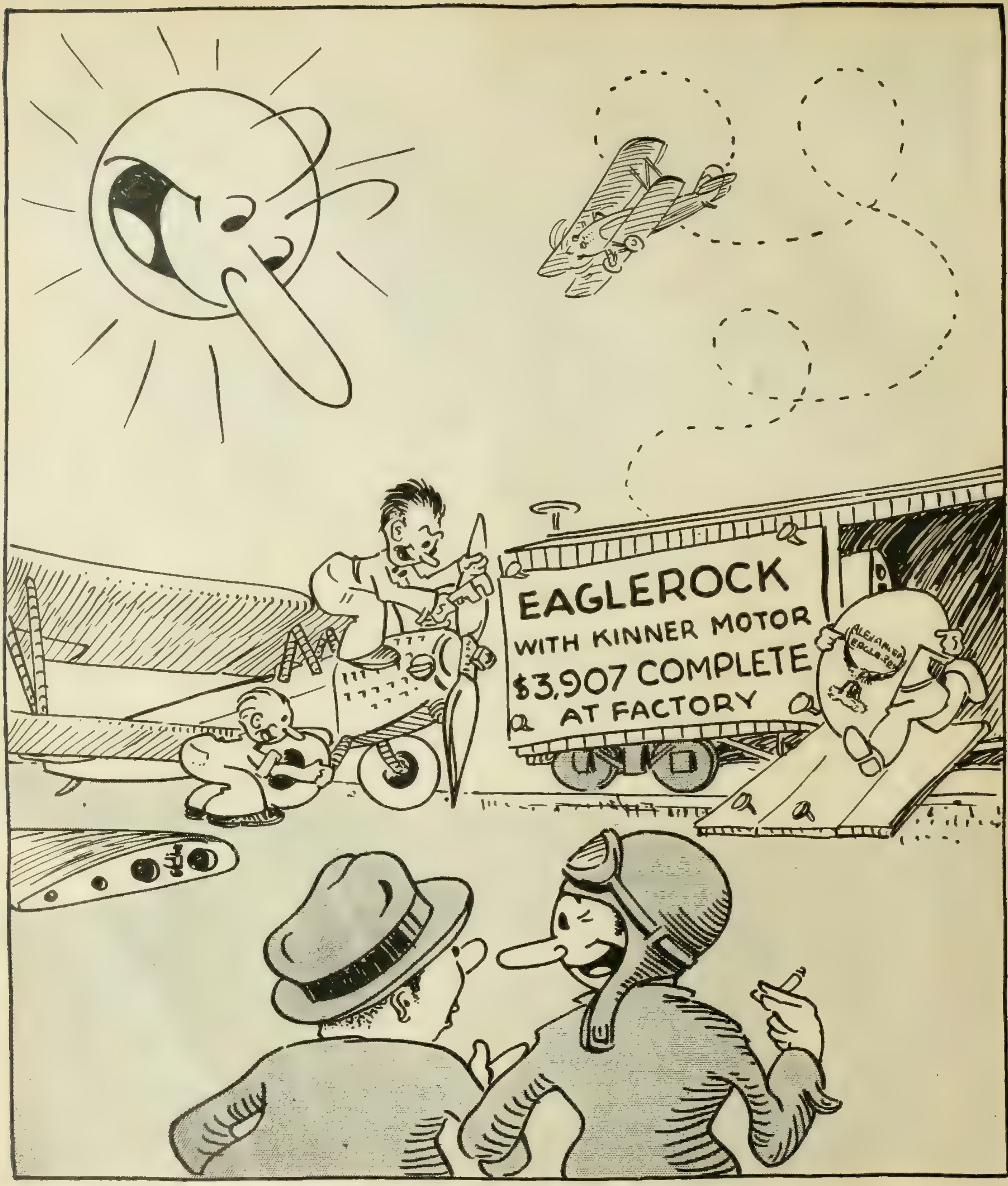
Position________________________________ Firm________________________________ City________________________________ AD 1-30



"Don't tell me, Looper, that you get all that airplane for that money—even the rudder, both wheels and all four wings?"

"Yes siree, the three-place Eaglerock with Kinner motor comes fully equipped for $3,907 factory field. And a great ship it is for training and commercial flying, too."

And Looper might also add that there are other planes in the EAGLEROCK line famed for their performance and economical operation. You can buy your choice on time.

For more details write or wire

ALEXANDER AIRCRAFT CO.

403 Alexander Industries Bldg.
Colorado Springs, Colo.

THE BERRYLOID FLEET — NUMBER TEN OF A SERIES

© 1929

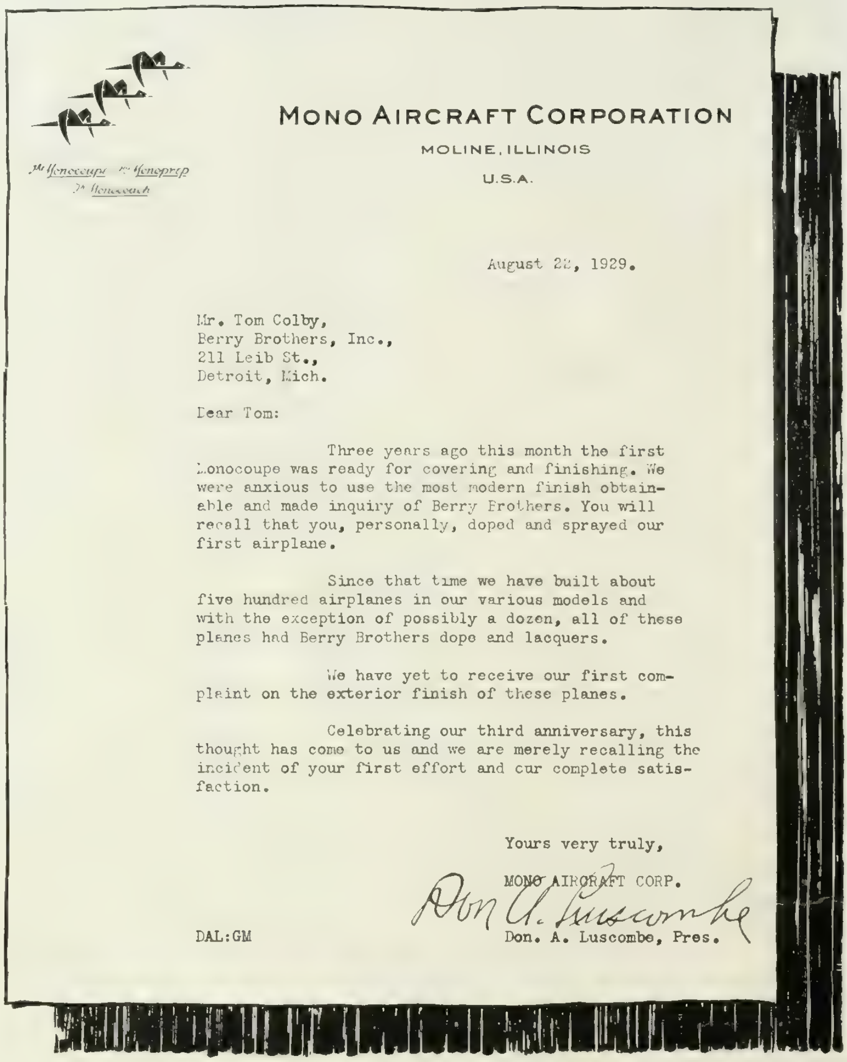
The Monocoupe and Berryloid AIRCRAFT FINISHES

Mono Aircraft Corporation's first ship was finished 100 per cent with Berryloid as are the planes now coming off the production line. The Red-winged Blackbird inspired the combination on the above Monocoupe —International orange, Boeing yellow and black.

MEMBER · AERONAUTICAL · CHAMBER · OF · COMMERCE

Not a complaint *in* three years

MONO AIRCRAFT
was preceded
in this series
by
STINSON
FOKKER
BUHL
TRAVEL AIR
EAGLEROCK
KEYSTONE
BOEING
COMMAND-AIRE
and
FAIRCHILD



The Monocoupe The Monoprep
The Monocoach

MONO AIRCRAFT CORPORATION
MOLINE, ILLINOIS
U.S.A.

August 22, 1929.

Mr. Tom Colby,
Berry Brothers, Inc.,
211 Leib St.,
Detroit, Mich.

Dear Tom:

Three years ago this month the first Monocoupe was ready for covering and finishing. We were anxious to use the most modern finish obtainable and made inquiry of Berry Brothers. You will recall that you, personally, doped and sprayed our first airplane.

Since that time we have built about five hundred airplanes in our various models and with the exception of possibly a dozen, all of these planes had Berry Brothers dope and lacquers.

We have yet to receive our first complaint on the exterior finish of these planes.

Celebrating our third anniversary, this thought has come to us and we are merely recalling the incident of your first effort and our complete satisfaction.

Yours very truly,

MONO AIRCRAFT CORP.

Don A. Luscombe

DAL:GM

Don. A. Luscombe, Pres.

DISTRIBUTORS OF BERRYLOID AIRCRAFT FINISHES:

Pacific Airmotive Corp.
3417 Angeles Mesa Drive, Los Angeles, Calif.

Platt & Tingle
49 S. W. First St., Miami, Florida

McMullen Aircraft Co.
Tampa, Florida

Air Associates, Inc.
Municipal Airport, Chicago, Ill.

Central Wall Paper & Paint Co.
Indianapolis, Ind.

Aero Supply Co.
531 W. Douglas St., Wichita, Kan.

Northwest Airways, Inc.
St. Paul, Minn.

Bredouw-Hilliard Aeromotive Corp.
604 Broadway, Kansas City, Mo.

Air Associates, Inc.
Roosevelt Field, Garden City, N. Y.

The Embry-Riddle Co.
Lunken Airport, Cincinnati, Ohio

Thompson Aeronautical Corp.
Municipal Airport, Cleveland, Ohio

Johnson Airplane & Supply Co.
Dayton, Ohio

Ludington Flying Service
Philadelphia, Pa.

Southern Aeromotive Service, Inc.
Ft. Worth, Texas

Northern Airways, Inc.
Wausau, Wisconsin

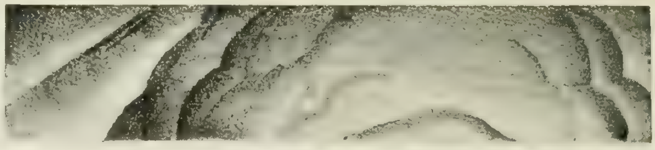
Aeronautical Corp. of Canada, Ltd.
Winnipeg, Canada

MANUFACTURERS · OF · PROGRESSIVE · AIRCRAFT · FINISHES

BERRY BROTHERS
Varnishes Enamels Lacquers
Detroit, Michigan *Walkerville, Ont.*

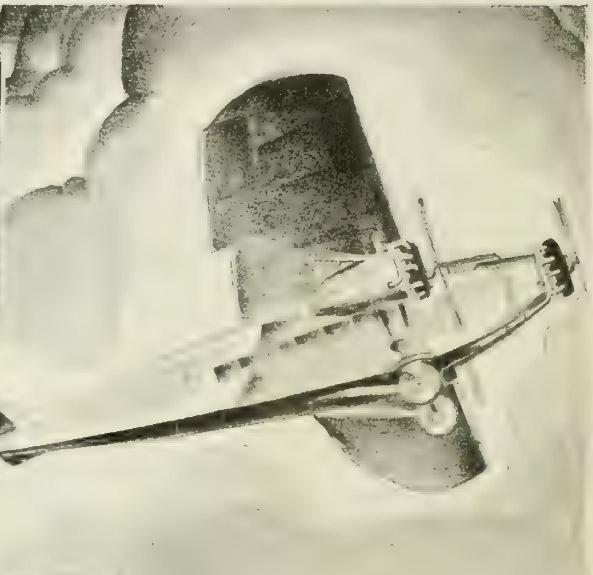
RING TRUE
BOHN
BEARINGS

do not fail!

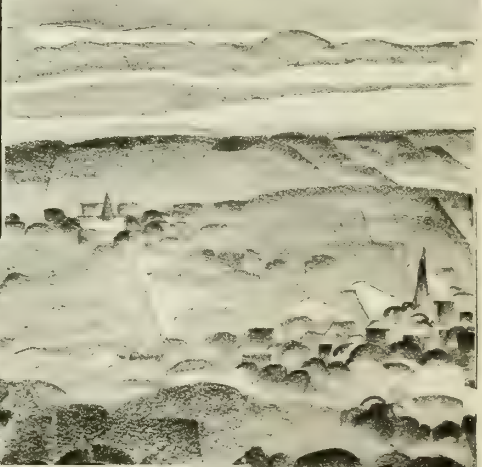


America's Finest Flying Course has

This Parks P-2 biplane is completely equipped for night flying with dual instrument board, landing lights and parachute flares. It is used nightly in the instruction of Transport Pilot students at Parks Air College.

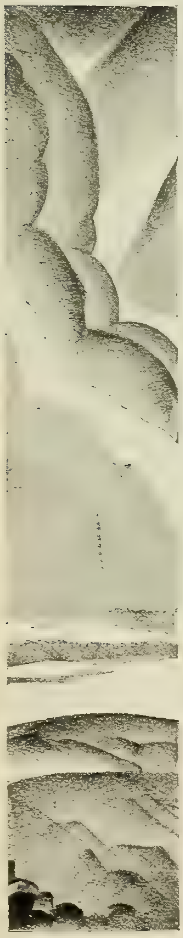


Group of Parks students inspecting the new tri-motored Ford. Each of these men will be given a thorough course of instruction, including five hours in absolute charge of this monster plane.



Parks student fueling new Ryan Brougham—a sister ship to Lindbergh's "Spirit of St. Louis"—which has recently been added to Parks equipment for student instruction.

been made *even better!*



GIANT tri-motored Ford monoplane, Wasp-powered, added to Parks equipment.

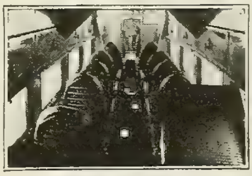
Parks Air College has taken another tremendous step forward.

To its mighty fleet of more than thirty training planes America's largest civilian flying school has now added a *giant, all-metal Ford monoplane,* powered by three 425-horsepower Wasp engines—an exact duplicate of the air leviathans in operation on the largest American passenger lines.

Every Parks transport student will receive thorough instruction in the handling of the new Ford—eight hours at its controls, including five hours *in absolute charge* of the huge plane.

The addition of this great new ship is one more reason why you should take your training at Parks. *No other aviation school has been so progressive* in furnishing its students with the very finest equipment money can buy.

The Parks training fleet of planes, for both day and night training, includes open cockpit ships of several types and of varying power, cabin planes of latest design, and big transport planes. In addition to the new Ford monoplane, we have just bought a six-passenger Ryan brougham, powered with a 300 h. p. Wright Whirlwind motor.



Interior view of our new Ford monoplane.

Every Parks flying school instructor holds a U. S. Government license, and is a man of high skill and thorough experience. They are all expert in their various fields. Some of them specialize in flying, others are ground school instructors doing nothing but classroom and lecture work, still others are practical shop men—and so on.

Mr. Parks personally supervises *every activity at the school.* He insists upon *thoroughness every step of the way.* He feels a personal responsibility for the training of every student.

No wonder that Parks Air College was one of the very first schools to be fully approved by the U. S. Dept. of Commerce! Small wonder that Parks graduates are grabbed up quickly by aviation executives to fill important jobs at big salaries!

You can't afford any training but the best. And you can get the best training *only at Parks.* Your future is in the balance. Don't gamble with it. There's a big job for you in aviation. Let Parks fit you for it. Take the first step *today.* Send the coupon for catalog.

IMPORTANT ANNOUNCEMENT—All Parks Air College courses will be advanced in price effective midnight, January 25, 1930. There is still time to enroll at present low prices. Send coupon—or wire—for information.

PARKS AIR COLLEGE

(Division of Detroit Aircraft Corporation)
166 Missouri Theatre Building

ST. LOUIS MISSOURI

»»» COUPON «««

PARKS AIR COLLEGE
166 Missouri Theatre Building, St. Louis, Missouri

Without cost or obligation to me,
please mail your illustrated catalog.

Name..
Street address..
City.......................... State..........................

Finer GEARS EXPERTLY MACHINED

Machined from the finest laboratory tested, high grade nitralloy steel, Axelson engine gears are then checked by a Socice Genoease gear testing machine.

Each separate gear is finished in perfect conformity with the Axelson master gauges.

The perfect fit means minimum friction. Consequently these vital motor parts have an almost unbelievably long life in Axelson Engines.

150 h.p., 7-cylinder, Radial Engine—Department of Commerce Approved Certificate No. 16.

The Axelson Catalog will interest you.

A
THE WINGED POWER

Axelson Aircraft Engine Co.
Factory and General Offices:
Corner Randolph St. and Boyle Avenue
Los Angeles, California P. O. Box 337

AXELSON AIRPLANE ENGINES

Kelsey-Hayes aircraft landing wheels were the first to be produced in quantities for this industry.

Today the majority of wheels used for aircraft are the Kelsey-Hayes product.

In developing new designs and refined construction Kelsey-Hayes Wheels have kept pace with the exacting aeronautical requirements.

Manufacturers have a wide variety of sizes from which to choose, ranging from the 14 x 3 tail wheels to the 36 x 8 side wheels.

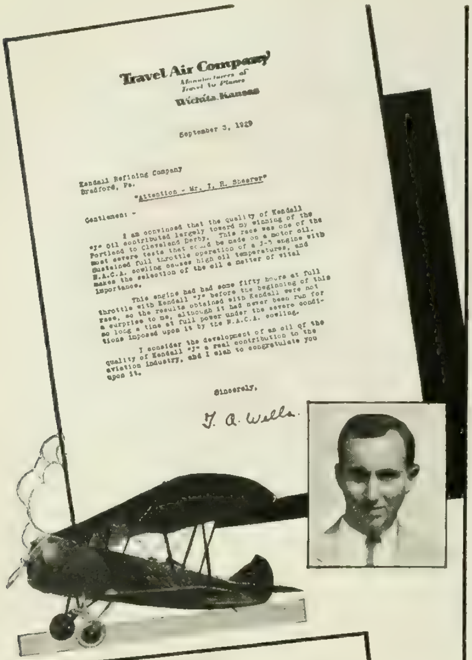
Kelsey-Hayes aircraft engineers will be glad to supply you with data as it applies to designs which you are now developing.

Aircraft Division
KELSEY-HAYES WHEEL CORP.
DETROIT, MICH.

Affiliated Divisions
Wire Wheel Corp. of America, Buffalo, N. Y.
Kelsey Wheel Company, Memphis, Tenn.
Kelsey Wheel Company, Ltd., Windsor, Ont.

KELSEY-HAYES

AIRCRAFT LANDING WHEELS



Travel Air Company
Manufacturers of
Travel Air Planes
Wichita, Kansas

September 3, 1929

Kendall Refining Company
Bradford, Pa.

"Attention - Mr. I. H. Shearer"

Gentlemen: -

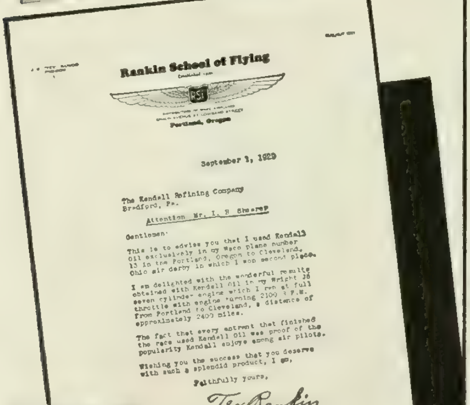
I am convinced that the quality of Kendall "J" Oil contributed largely toward my winning of the Portland to Cleveland Derby. This race was one of the most severe tests that could be made on a motor oil. Sustained full throttle operation of a J-5 engine with N.A.C.A. cowling causes high oil temperatures, and makes the selection of the oil a matter of vital importance.

This engine had had some fifty hours at full throttle with Kendall "J" before the beginning of this race, so the results obtained with Kendall were not a surprise to me, although it had never been run for so long a time at full power under the severe conditions imposed upon it by the N.A.C.A. cowling.

I consider the development of an oil of the quality of Kendall "J" a real contribution to the aviation industry, and I wish to congratulate you upon it.

Sincerely,

T. A. Wells



Rankin School of Flying
Portland, Oregon

September 3, 1929

The Kendall Refining Company
Bradford, Pa.

Attention Mr. I. H. Shearer

Gentlemen:

This is to advise you that I used Kendall Oil exclusively in my Waco plane number 13 in the Portland, Oregon to Cleveland, Ohio air derby in which I won second place.

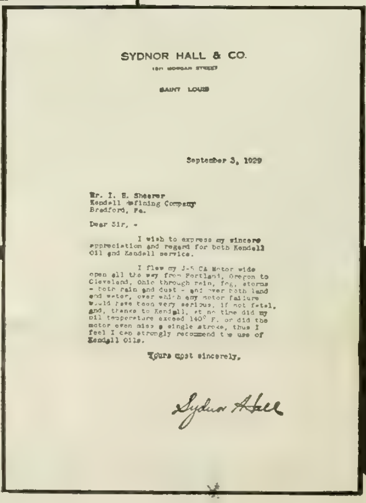
I am delighted with the wonderful results obtained with Kendall Oil in my Wright J6 seven cylinder engine which I ran at full throttle with engine turning 2100 R.P.M. from Portland to Cleveland, a distance of approximately 2400 miles.

The fact that every entrant that finished the race used Kendall Oil was proof of the popularity Kendall enjoys among air pilots.

Wishing you the success that you deserve with such a splendid product, I am,

Faithfully yours,

Tex Rankin



SYDNOR HALL & CO.
SAINT LOUIS

September 3, 1929

Mr. I. H. Shearer
Kendall Refining Company
Bradford, Pa.

Dear Sir, -

I wish to express my sincere appreciation and regard for both Kendall Oil and Kendall service.

I flew my J-5 CA Motor wide open all the way from Portland, Oregon to Cleveland, Ohio through rain, fog, storms - both rain and dust - and over both land and water, over which any motor failure would have been very serious, if not fatal, and, thanks to Kendall, at no time did my oil temperature exceed 140° F. or did the motor even miss a single stroke, thus I feel I can strongly recommend the use of Kendall Oils.

Yours most sincerely,

Sydnor Hall

One-two-three
All veterans

Up from the sunkist shores of the Pacific Coast . . . Up over the snow and ice-capped peaks of the Rockies . . . through Rain and Fog and Storm . . . roared the contesting planes in the Portland-Cleveland Air Derby. A glorious race and a great feat for those who finished.

T. A. Wells, the winner, spares no words in praising Kendall Oil and the way in which it stood up in his Wright J-5 powered Travel Air Speedwing Biplane with wide open throttle. Tex Rankin, who placed second, raced the Wright J-6 Engine in his Waco Taperwing at 2100 RPM for 2400 miles and Kendall stood the test. When Sydnor Hall finished third, also with Kendall, he reported that not once in the entire flight, even with the throttle wide open, did the oil temperature of his Wright J-5 Motor exceed 140° F.

Read the letters of the three winners. We could add nothing more to them, except to suggest that you try Kendall Oil yourself. You will be surprised at the marked improvement in the performance of your motor. The long life of the oil (Kendall need be changed only every thirty hours), easy starting, and that added power which is so necessary for a quick climb or in a cramped take-off, are a few welcome advantages gained through the use of Kendall Oil.

BUY AT THIS SIGN
PENZBEST
KENDALL
PENNSYLVANIA OIL
MOTOR OILS
IT IS YOUR PROTECTION

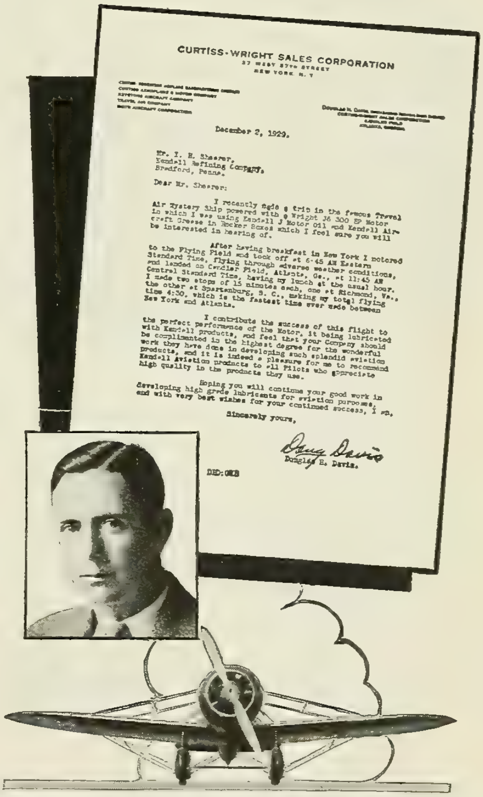
and Davis makes four.....
who praise Kendall performance

BREAKFAST in New York . . . luncheon at Atlanta, Ga. . . . 785 miles in 4½ hours. That sums up the record breaking flight on November 7, 1929, of Douglas Davis in the famous Travel Air Mystery Plane.

With the 300 H. P. Wright Motor pulling the staunch plane at a breath-taking clip . . . here was an adventure as thrilling as any in the annals of aviation. Flying conditions were at their worst. Rain . . . fog, the Octopus of aviation . . . buffeting winds . . . a varying ceiling—at times 300 feet, minutes later, 3000 . . . every circumstance a challenge. That Davis came through, is a tribute to his uncanny skill, an accomplishment to his credit.

But "Doug" graciously and generously attributes the success of the flight to the perfect performance of motor and ship. And to Kendall Oil, used throughout, he gives unstinted praise. During the entire flight, Kendall gave excellent lubrication to every vital part of the motor. It maintained a complete piston seal at the varying temperatures encountered, increasing power and conserving fuel. Add to these the fact that even at a speed of over 200 miles an hour, the engine did not overheat, and you realize just how good a job Kendall did on this hazardous flight.

And this same high grade oil, Kendall-J, is available for your engine at almost every airport. Try it for springtime results on winter flights.



CURTISS-WRIGHT SALES CORPORATION
27 WEST 57TH STREET
NEW YORK, N. Y.

December 2, 1929.

Mr. T. E. Shearer,
Kendall Refining Company,
Bradford, Penna.

Dear Mr. Shearer:

I recently made a trip in the famous Travel Air Mystery Ship powered with a Wright J6 300 HP Motor in which I was using Kendall J Motor Oil and Kendall Aircraft Grease in Rocker Boxes which I feel sure you will be interested in hearing of.

After having breakfast in New York I motored to the Flying Field and took off at 6:45 AM Eastern Standard Time, flying through adverse weather conditions, and landed on Candler Field, Atlanta, Ga., at 11:45 AM Central Standard Time, having my lunch at the usual hour. I made two stops of 15 minutes each, one at Richmond, Va., the other at Spartanburg, S. C., making my total flying time 4:30, which is the fastest time ever made between New York and Atlanta.

I contribute the success of this flight to the perfect performance of the Motor, it being lubricated with Kendall products, and feel that your Company should be complimented in the highest degree for the wonderful work they have done in developing such splendid aviation products, and it is indeed a pleasure for me to recommend Kendall Aviation products to all Pilots who appreciate high quality in the products they use.

Hoping you will continue your good work in developing high grade lubricants for aviation purposes, and with very best wishes for your continued success, I am,

Sincerely yours,

Doug Davis
Douglas H. Davis.

DHD:GEB

What makes Kendall the finest Oil of the Airways?

Kendall represents to the highest degree that all important quality in a lubricant . . . PURITY. Even at the wells this is in evidence. For Kendall is refined from the finest, 100% Bradford Crude. All impurities are removed through straight mechanical methods. No chemicals are introduced. The harmful wax has been removed to the vanishing point. That is why Kendall does not congeal under low temperature. It provides instantly, constantly, the right film of oil for correct lubrication.

May we send you some interesting literature about Kendall Oil together with a list of the airports where it is obtainable through our extensive distributing outlets? Address: Kendall Refining Company, Bradford, Pa.

KENDALL OIL

REFINED FROM 100% BRADFORD
GRADE OF PENNSYLVANIA CRUDE

AIR-MINDED AMERICA

THINGS that contribute to the safety of flying add most to its popularity. -TP- Oils add to the safety of flying. When the public thoroughly knows the story of -TP- Aero Motor Lubricating Oil, people will fly with greater confidence knowing that -TP- is in the engine.

-TP- Oils are new—the latest development in scientific lubrication. They have been tested and approved by leading manufacturers of airplane engines and by many leading pilots. They are straight-run oils, not blended or compounded, produced from pure, paraffine-base crude by a process for which patents are pending.

This process has marked advantages over other methods. It removes all the paraffine wax, while preserving all the lubricating bodies in the crude. Elimination of the wax is responsible for its low cold test.

In terms of performance this means uniform viscosity at all working temperatures, minimum carbon deposit and ignition trouble from fouled spark plugs, easy cold priming, immediate oil pressure, perfect lubrication winter and summer, on the ground or at high altitudes—a maximum of safe flying hours.

A handsome, practical *Pilot's Log Book* sent free on request.

-TP- Aero
Valve Spring
Lubricant

Also
-TP- Aero
Rocker Arm
Lubricant

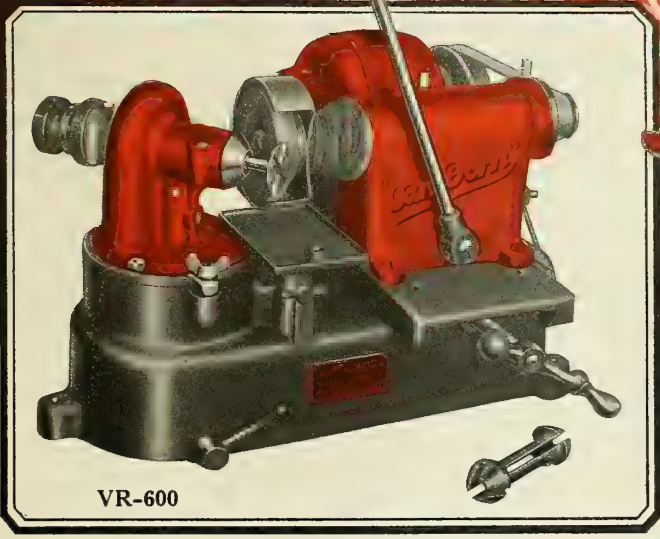
TEXAS PACIFIC COAL AND OIL COMPANY
FORT WORTH, TEXAS
New York St. Louis Los Angeles

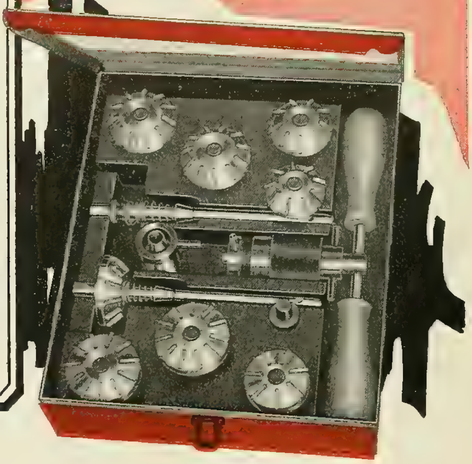
-TP- AERO MOTOR LUBRICATING OIL
REG. U. S. PAT. OFF.

2776

PREVENT VALVE TROUBLE IN THE AIR

Valve failure is frequently the result of misalignment between the seat and guide. Valve reconditioning with the Van Dorn Self-Centering Aircraft Pilots and the Van Dorn Aircraft Valve Refacer produces a precision job, insuring better and safer engine performance.


VR-600



VAN DORN AIRCRAFT VALVE REFACER

Capacity $\frac{1}{4}''$ to $\frac{11}{16}''$ valve stem diameters.

A precision grinding machine for refacing valves true to their stems. In addition it will accurately sharpen valve seat cutters, grind rocker arms, etc.

Valves are chucked accurately with twin grip collets which are suitable for aircraft valves with short stems.

VR-600 . . . . $157.00

DO THE JOB RIGHT ON THE GROUND

VAN DORN AIRCRAFT VALVE RESEATING SETS

Contain all the necessary equipment for recutting Airplane Engine Valve Seats rapidly and accurately.

UNIVERSAL AIRCRAFT VALVE RESEATING SET

Will service practically all makes of engines.

No. 55 .... $98.00

CURTIS OX-5 VALVE RESEATING SET

No. 56 .... $40.00

WRIGHT VALVE RESEATING SET

for Wright J-5, J-6 and R-1750 Engines

No. 57 .... $68.00

The Van Dorn Electric Tool Company - Cleveland, Ohio

FLIGHTEX PRODUCTS

REGISTERED U.S PAT OFF.

E. S. TWINING & CO.

wish to announce

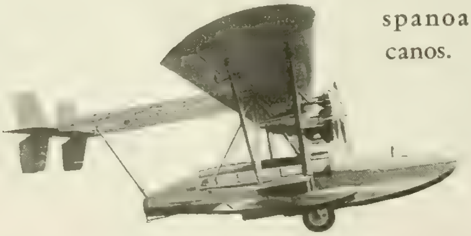
their consolidation with

WELLINGTON, SEARS & COMPANY

representing one of the largest groups of textile mills in the United States. They have long been leaders in the manufacture and distribution of fabrics used by the aircraft and mechanical trades. As a result of this consolidation with them, your interests will be even better served.

FOR SOUTH AMERICAN SUBSCRIBERS

El Avión Anfibio Sikorsky está cubierto con Tela "Flightex" como lo están tambien más del 75% de los aviones americanos que se han embarcado a los paises Hispanoamericanos.



Nos es grato informar a nuestros amigos Sudamericanos que la Pan-American Aviation Supply Corporation tendrá en existencia las afamadas Telas "Flightex" Calidad 'A' y Cintas para ser distribuidas en Centro y Sud America.

WELLINGTON, SEARS & COMPANY

65 WORTH STREET
NEW YORK

ANNOUNCING *The New*

MIKO Spark Plugs

To provide the widest possible range of selection, AC now offers, in addition to its well known line of porcelain-insulated spark plugs, a complete line of mica-insulated spark plugs, especially designed for aircraft engines.

The new Miko plugs are available in a heat range, with gradations of insulator lengths, to meet the heat characteristics of different engines and different operating conditions.

Into these new Miko plugs have been built these important superiorities:

Laboratory tested mica of highest insulating quality.

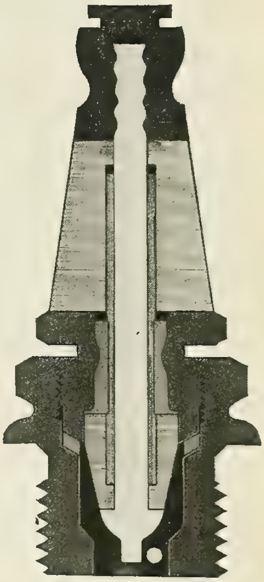
Sealed by electrical process. Absolutely gas tight.

The "Isovelt" electrode, a new development, insures uniform sparking voltage, and requires 50% less voltage than other wire.

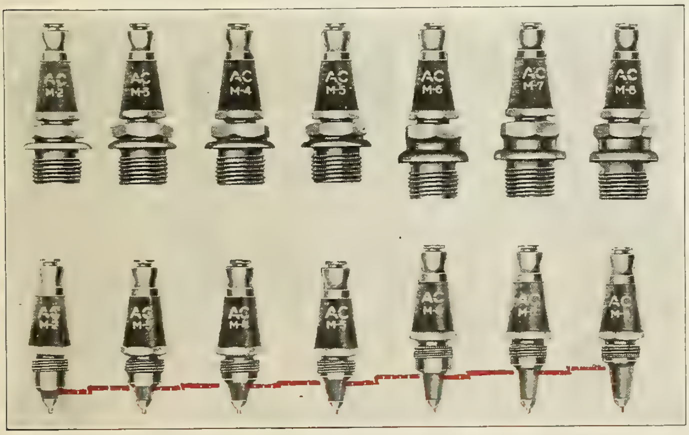
Electrically welded, patented side electrode provides 35 times better electrical and 3 times better heat conductivity.

Terminal and center electrode are fused by electrical process, eliminating danger of terminal becoming loose.

The illustration below shows the seven new AC MIKO Spark Plugs for aircraft engines in order of their heat range.



Cutaway view showing superior construction of AC Miko Spark Plug



The popular line of AC porcelain-insulated aircraft spark plugs are likewise available in a heat range, with gradations of insulator lengths, to meet the heat characteristics of different engines and different operating conditions.

The length of insulation, shown below the dotted line in the illustration to the left, governs the AC heat range. The shorter the insulation exposed to the combustion gases, the cooler the plug; the longer this insulation, the hotter the plug.

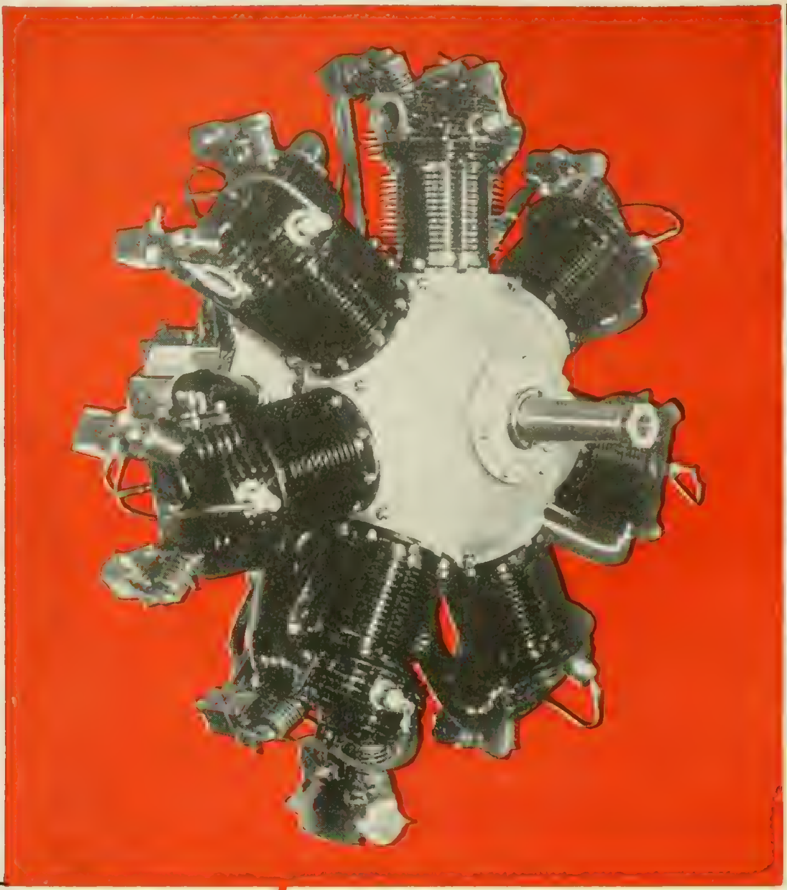
AC-SPHINX
Birmingham
ENGLAND

AC Spark Plug Company
FLINT, *Michigan*

AC-TITAN
Clichy (Seine)
FRANCE

© 1930, AC Spark Plug Co.

AC SPARK PLUGS AC SPEEDOMETERS AC AIR CLEANERS AC OIL FILTERS AC FUEL PUMPS
AC GASOLINE STRAINERS AC AMMETERS AC OIL GAUGES AC THERMO GAUGES AC GASOLINE GAUGES



Announcing
1930 SERIES
WARNER "Scarab" ENGINES

THE
Scarab

Constant research work—a close contact with all aircraft progress both in America and abroad—and the experience gained in capturing every event in its power class (National Air Races and Derbies) for the last two successive years has enabled Warner to keep this quality achievement in advance of current practice.

The new 1930 series of 110 H. P. Warner Scarabs, incorporated in which are a veritable wealth of engineering refinements of vital aeronautical importance, are now ready for your inspection and comparison.

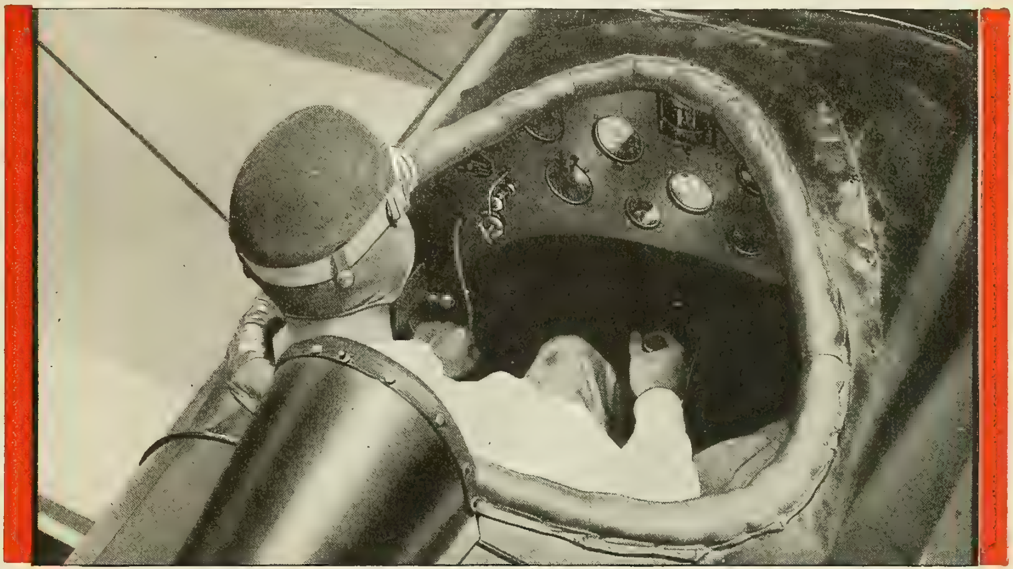
Outstanding Features

- Perfection of balance giving smoothest possible operating results.
- Maximum effectiveness in cooling under all operating conditions.
- Improved rocker arm mechanism insuring greatest dependability.
- More flying hours with less maintenance.

Warner engines can be secured in the ship of your choice. Complete information on request.

WARNER AIRCRAFT CORPORATION, DETROIT, MICH.

TESTED, RETESTED—AND FINALLY APPROVED



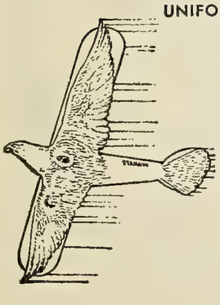
STANAVO THE NEW AVIATION ENGINE OIL, IS WINNING THE ENDORSEMENT OF FLIERS FROM COAST TO COAST . . .

CHANCE played no part in the development of STANAVO, a superior aviation engine oil produced by the leading experts and engineers of the Standard Oil Company of California — Standard Oil Company (Indiana) — Standard Oil Company of New Jersey.

Hundreds of rigid laboratory tests — the test of hundreds of flying hours under all conditions—were performed before the Stanavo Specification Board, Inc., was satisfied that Stanavo Aviation Engine Oil was an oil of a QUALITY, UNIFORMITY AND STAMINA HITHERTO UNKNOWN.

In all tests — long flights, short flights, altitude, climatic, unusual installation, different motors and planes—Stanavo proved its quality so convincingly that it is now offered for general use by these three makers of petroleum products with absolute confidence that the world of aviation will find it unsurpassed.

Today aviators are finding Stanavo from coast to coast an absolutely uniform aviation engine oil, of the best viscosity temperature relationship and lasting qualities—an oil of greater stamina which after 25 to 30 hours' use is often found cleaner and better than the average new oil.



STANAVO

AVIATION ENGINE OIL

One Brand—STANAVO. One Quality—the Highest, Throughout the World.

STANAVO SPECIFICATION BOARD, Inc.

1911 Chanin Building—122 East 42nd Street, New York City

FLYING DOWN TO ECUADOR

Passing El Misti in the Peruvian Andes at 110 miles an hour

The Ford Plane

The Ford plane is planned, constructed and operated as a commercial plane. Built of corrugated aluminum alloys, it has great structural strength, unequaled durability, and is most economical to maintain in operation. The uniformity of its material is determined by scientific test. All planes have three motors in order to insure reserve power to meet and overcome all emergencies. The engines may be Wright or Pratt & Whitney, air-cooled, totaling from 900 to 1275 horse-power. Ford planes have a cruising range of from 580 to 650 miles at speeds between 55 and 135 miles per hour. Loads may be carried weighing from 3670 to 6000 pounds.

The human capacity of these planes is 13 to 15 passengers and a crew of two (pilot and assistant). Each plane is equipped with a buffet, toilet, running water, electric lights, adjustable chairs.

The price of the Ford tri-motored, all-metal plane is exceptionally low because of its highly scientific methods of commercial production. Price is $42,000 to $55,000 at Dearborn.

Ford branches will be glad to give you information on the Ford tri-motored, all-metal plane in all models.

A LITTLE MORE than a year ago we wrote as a prophetic statement that American air-lines would soon be reaching down to the mainland of South America! Today big tri-motored, all-metal Ford planes are not only reaching the mainland of South America, from Panama, the West Indies, and Florida, but they are flying on, farther and farther southward, where there are no roads, no trails, and man can only cross geographical barriers by taking wings across the sky. . . .

Pan-American air-liners, using only multiple-engined planes of large passenger capacity, are winging over the islands of the Gulf of Mexico and the countries of the mainland. Well-organized tours, operating in conjunction with railroads and steamships, reach Nassau, Mexico, Cuba, Haiti, Dominican Republic, Republic of Panama. In addition, there are 4000 miles of airways over which the Pan-American carries mail to Honduras, British Honduras, Nicaragua, Costa Rica, Colombia and Curacao.

Over the South American mainland the Pan-Grace lines, co-operating with the Pan-American, are sending Ford planes speeding across the jungles and mountains of Venezuela, Colombia, Ecuador, Peru and Chile on regular schedules!

Ford planes have proven to be most logical vehicles for these great pioneer lines that must operate over enormous distances and hazardous country with the safety and efficiency of railroads.

FORD MOTOR COMPANY

Visitors are always welcome at the Ford Airport at Detroit

Going aboard for a long tour across tropical skies

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AERO DIGEST

THE MAGAZINE OF THE AIR

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Cover Design—Consolidated "Commodore" Flying Boat

Ford trimotored transport plane over the field at Kastrup, the airport at Copenhagen, Denmark, during its recent tour of Europe

COMPETITION in the WORLD MARKET

By Leighton W. Rogers

Chief of the Aeronautics Trade Division
Bureau of Foreign and Domestic Commerce

THAT competition is the spice of trade is applicable nowhere more than in respect to the world market. Heredity, environment, specialized training and the availability of raw materials often make it not only impracticable, but impossible, to duplicate in one country a product peculiar to another. It is logical to believe that Spain, its climate, its terrain, and its history of conquest made the Autogiro possible just as the thick airfoil was perhaps most apt to be developed near the canals and in the humid atmosphere over the Netherlands. The mountains, green valleys, broad plains, and sandy shores of America, as well as the pioneer ancestry of the Wright brothers, certainly had some influence on the fact that Kitty Hawk was the scene of the first airplane flight.

Leighton W. Rogers

From the first export of an airplane, in 1909, when the Wright brothers shipped their biplane to France, there has developed an item in international trade which, although at present almost insignificant compared with other transport equipment, will eventually become one of the major items.

As nearly as can be determined from available data, the world exports of aeronautic products last year amounted to about $22,000,000, of which the United States shared in but seventeen (17) per cent. From all indications, the combined aeronautic exports of all producing nations will amount to $32,000,000 in 1929. The United States' share in world shipment of aircraft, parts and engines should at least be twenty-four (24) per cent of this amount. Note the improvement in our position. The United States exported aeronautic products valued at $7,761,977 during the first ten months of 1929—an increase of 112 per cent over those for the whole of 1928. The accompanying tables show the units and values of the three aeronautic items exported, as well as the countries of destination. The appreciable increases over last year are significant. When compared with the available data on exports from England, France and Germany, they bring out the following illuminating facts:

(1) The ratio of aeronautic exports to production is far higher in other producing nations than in America. (2) France's aeronautic exports decreased from over $8,000,000 in 1927 to $5,650,000 in 1928. (3) France and England have shared in the bulk of this trade—the United States entering as a formidable competitor at the beginning of 1929. (4) From all indications, by the end of 1930 the United States will lead in the export of aeronautic products.

To explain the reasons for these trends, it is necessary to consider a brief survey of manufacture and merchandising conditions. The principal exporting countries—England, France and Germany—are discussed in the order of their importance with mention of the progress they have made in foreign fields in comparison with our own. It should be remembered that the United States' production of aircraft is the largest, estimated at 5,100 for 1929. France's is next at 1,200, England's at 600, and Germany's at 400. Let us consider England's position in the world market first.

THE United Kingdom exported $8,450,000 worth of aircraft and parts, including engines, during the first ten months of 1929, as compared with $6,500,000 worth for the whole of 1928. No statistics are now available as to countries of destination for these shipments, but it is known that Canada and Australia are among the best markets. Advertisements for a certain type of British airplane show these popular little aircraft to be in use in practically every country on the globe. We have a recent report to the effect that four pontoon-equipped models were sold in Portugal for training purposes; we know also that they are numerous in South America and the Far East, as they are in the British Colonies and Dominions. Their prices are attractive.

We have heard that in various parts of the world they undersell American sport and training planes with up-to-date engines, by from $800 to $1,500. This price advantage may be explained by the fact that Great Britain has had in operation for a number of years an effective flying club plan which has created an appreciable domestic market for planes of the Moth and Avian type. When strictly private flying in America has reached the stage of development that it has in England, price reductions for our sport and training types will result. The competition overseas will then be on the basis of quality and performance, as well as service, rather than on that of cost. The National Aeronautic Association club plan should have a favorable bearing on our domestic market, and it follows that it will also effect indirectly the sale of our planes overseas.

British manufacturers of light planes are specialists in the production of standardized and efficient aircraft. Of equal importance is the fact that they are merchandizers. Enquire of most any airplane company in England for performance data and prices, and you will receive a prompt and complete reply leaving you in doubt about no point which would interest a prospective customer. The quotation will be given so that you can determine what the plane will cost at your flying field or railway station. The interesting house organ and descriptive literature accompanying the courteous letter in response to your inquiry could well be used as a model for American sales managers to follow.

As opposed to this condition, the Aeronautics Trade Division of the Department of Commerce has sometimes had a difficult time getting American manufacturers to submit adequate information in answer to overseas inquiries. In two cases within the past month, some worthwhile business has materialized for those concerns which recognized that prompt and adequate action would bring a profit from business opportunities which the Division made known to all firms building planes with Approved Type Certificates.

It is believed that the major portion of British exports has consisted of light planes of various makes. One com-

Dutch Fokker biplane equipped with Aerol shock-absorber struts and Bendix wheel brakes of American make

petitive factor to be considered is that the wings of these British models fold back, enabling a saving of one-third in hangar space. This is an important item and a factor militating against United States producers in the sale of sport and training planes in the world market. Indeed, there is only one among our more important manufacturers of single-engined cabin planes supplying to any considerable extent folding wing jobs of this type. Which is one reason for the comparative popularity of this particular make in foreign countries. The airworthiness requirements of aircraft-producing nations are now sufficiently rigid to preclude all but the remotest possibility of wing failure, and, for that matter, other forms of structural failure.

England is noted also for its fighting craft, which have excellent performance—even better in some cases than those produced in this country. Various types of British military aircraft are finding their way into the world market. Some navy seaplanes from England are in use on the west coast of South America. British designers are skillful in obtaining super-performance; for example, the Schneider racers. It is believed, however, that in an attempt to obtain grace of design and performance they sometimes sacrifice ruggedness. Our pursuit planes, for example, must have a safety factor of twelve, whereas one single-seater British fighter recently imported into this country which had slightly better performance than our comparable types, had a safety factor of eight. American pursuit and observation planes are now being supplied to South American governments, China, Siam and the Netherlands East Indies in competition with products of British, France and Netherlands factories. Performance, consistent with strength is our strongest selling point in the military aircraft market. Variety of types and dependability favor our commercial planes.

FRANCE, with an aircraft production of between 1,100 and 1,500 during 1928 (second to the United States, which produced at least 6,000 aircraft that year), exported $5,650,000 worth of aeronautic equipment during last year as compared with slightly over $8,000,000 for 1927 and $6,440,000 during the first eight months of the current year.

Statistics indicating the respective quantities received by consignee countries are not available by units of value, but by weights only. The latter indicate that Czechoslovakia and Rumania were by a wide margin the leading French markets. Brazil, Greece, Switzerland and Poland followed in order of their importance. That European countries should patronize the subsidized French aircraft factories is natural because of prices made possible by the large government appropriations. And, of course, proximity is a potent factor. It is believed that the majority of the French aircraft exported are military types. Political considerations are naturally involved in these sales, as also is the ability to grant long-term credits which are made possible by French subsidies.

It is significant that in Czechoslovakia, the largest market for French airplanes, an American all-metal transport monoplane with three engines was recently sold. It brought a price equivalent to its F.O.B. price in the

Table No. 1

U. S. EXPORTS OF AIRPLANES, SEAPLANES AND AMPHIBIONS

Countries of Destination	Full Year of 1928 No.	Full Year of 1928 Value	1st 10 Months of 1929 No.	1st 10 Months of 1929 Value
Mexico	20	$190,133	80	$1,504,001
Chile	..	......	40	721,750
Canada	62	685,712	71	713,889
Argentina	5	55,052	18	340,888
Japan	3	63,000	17	291,767
Ecuador	..	......	2	187,237
Brazil	5	66,340	4	145,200
China	9	102,175	9	142,975
Panama	1	23,844	7	112,353
Peru	24	199,810	6	106,852
Hong Kong	..	......	11	104,600
Italy	2	84,950	4	86,569
United Kingdom	3	22,263	2	68,600
Philippine Islands	2	34,500	4	68,114
Colombia	1	19,250	1	60,000
Salvador	..	......	3	27,840
Cuba	4	54,887	2	21,800
Honduras	1	9,000	2	19,645
Netherlands	..	......	3	16,000
Guatemala	3	36,400	4	10,000
Norway	..	......	2	8,053
French Oceania	1	6,000	1	7,000
Australia	7	50,872	1	3,600
Dominican Republic	..	......	1	2,525
New Zealand	..	......	1	2,181
Uruguay		......	1	1,800
Germany	1	5,500	..	......
Belgium	1	4,183	..	......
Siam	4	38,400	..	......
Switzerland	2	4,532	..	......
Bermuda	1	2,850	..	......
	162	$1,759,653	300	$4,775,235

Table No. 3

U. S. EXPORTS OF AIRCRAFT PARTS, EXCEPT TIRES

Country of Destination	Full Year of 1928	1st Ten Months of 1929
Canada	$340.215	$762.123
Soviet Russia in Europe	155,313	159,668
Peru	15,693	110,750
Mexico	21,162	95,941
China	86,888	90,034
Germany	70,548	75,689
United Kingdom	58,165	58,126
Japan	31,797	55,545
Cuba	24,184	38,956
Argentina	15,499	39,225
Chile	17,443	37,302
Panama	22,705	31,535
Netherlands	20,483	26,035
Poland and Danzig	4,575	23,440
Colombia	10,483	20,422
Philippine Islands	53,630	19,929
France	1,302	19,904
Italy	6,546	19,108
Belgium	....	13,580
Australia	2,741	13,462
Brazil	40,686	10,912
Hong Kong	2,182	5,500
Bermuda	....	4,575
Finland	....	4,050
Nicaragua	990	2,865
Denmark	..	2,742
Siam	1,101	2,034
Sweden	4,455	1,946
Salvador	....	1,913
British West Indies	....	1,625
Virgin Islands	....	1,603
Belgium	....	1,555
Norway	1,925	1,500
New Zealand	....	1,363
Honduras	2,253	1,331
Czechoslovakia	3,890	1,096
Ecuador	....	1,030
French Oceania	....	800
British Guiana	....	655
Trinidad	....	367
French West Indies	....	300
Dominican Republic	....	145
Java and Wandura	3,250	67
Haiti	....	56
British India	....	31
Venezuela	....	17
Switzerland	950	15
Spain	15,940	...
Guatemala	1,517	....
Other countries	732	4,617
	$1,240,244	$1,765,544

Table No. 2

U. S. EXPORTS OF AIRCRAFT ENGINES

Countries of Destination	Full Year of 1928 No.	Full Year of 1928 Value	1st 10 Months of 1929 No.	1st 10 Months of 1929 Value
Germany	23	$132,510	48	$315,576
Panama	1	150	30	159,096
Poland and Danzig	1	3,574	35	121,015
Mexico	10	24,773	38	107,355
Canada	43	177,946	24	92,086
Japan	10	41,281	24	75,098
Peru	2	8,002	7	43,242
Philippine Islands	..	......	4	39,003
China	5	38,900	9	39,000
Argentina	7	23,315	12	32,132
Chile	..	......	6	30,577
France	3	6,223	9	30,061
Colombia	..	......	3	20,021
Soviet Russia in Europe	..	......	2	19,643
Switzerland	..	......	1	19,375
United Kingdom	29	75,780	3	12,100
Belgium	1	10,000	1	12,000
Netherlands	14	62,712	5	11,500
New Zealand	..	......	2	8,151
Italy	4	8,338	3	5,660
Honduras	..	......	2	4,949
Cuba	3	250	1	4,827
Nicaragua		......	1	4,000
Dutch Guiana	..	......	1	4,000
Brazil	8	6,200	2	2,898
Guatemala	..	......	3	2,350
Sweden	2	19,911	3	1,810
Australia	2	1,525	2	1,529
Salvador	..	......	1	913
Trinidad	..	......	1	766
Norway	..	......	1	200
French Oceania	..	......	1	150
Denmark	1	19,345	..	......
Spain	1	3,111	..	......
Hong Kong	4	980	..	......
	179	$664,926	285	$1,221,198

United States, after having been flown on an extensive itinerary throughout Europe. This transaction may be used to stress two important factors in our overseas competition: (1) Actual demonstration in the field is a requirement in order to effect most sales of aircraft; (2) a product the worth of which has been proved by profitable operation in the United States need not be sold at a reduced price nor on a consignment or credit basis. The recent sale of the American plane in Czechoslovakia is the first one to be made in Europe under like circumstances. Others will undoubtedly follow.

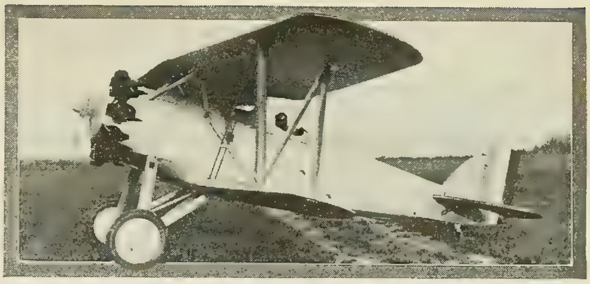
Brazil, it will be noted from the accompanying tables, received four airplanes valued at $145,200, and $10,912 worth of parts, from the United States during the first ten months of the year. The average value of these planes is high; they were not of military type, but for service on the American airlines operating in South America. For several years the French Aeropostale line has operated through Brazil. These operations mean exports of equipment. Now that United States operators are extending their services into South America, this country will not be at the disadvantage it has been heretofore.

There are French military missions in both Brazil and the Argentine, and French military aircraft are in the majority in those countries. Recently, however, orders were placed for various types of American commercial and military aircraft. No price nor credit concessions are known to have been made in order to obtain this business, which was sought by manufacturers of varying nationality. French airmen have performed some remarkable and valuable long-distance flights recently. The competition from France for overseas business is now, and will continue to be, formidable because of concerted efforts the French are making.

Fairchild cabin monoplane, with wings folded, being hoisted onto a steamer for export shipment

GERMANY, with its Dornier Do.X. and new Junkers G.38, and with exports of $1,119,000 worth of aircraft during the first eight months of 1929, as compared with slightly over $1,250,000 for the whole of 1928, is as much in the business of exporting technical ideas as tangible aeronautic commodities. It is believed within the realm of possibility that the Dornier Do.X. will eventually be exported to the United States under its own power, for it is considered fully capable of flying across the Atlantic Ocean. Several smaller Dorniers have been imported for operation on an intra-American airline and are attracting considerable interest in this country. Some engines among those shown in Table 2 as being exported from America to Germany were re-exported back home as a part of the Dornier Wal seaplane shipments to the United States, though others are now in foreign service.

Stinson-Detroiter used on a Chinese air mail line



Boeing fighting plane purchased by the Japanese government

Germany, it will be noted from Table 2, was the leading market for American engines of high average value (indicating high horsepower). Because of our specialization and peculiar success in the production of air-cooled radial types, we have been in an enviable position in the marketing of this item abroad.

A European friend, in a recent letter, gives the crux of the competitive situation with regard to aircraft engines. He puts it quaintly, but pertinently, as follows:

"It seems that European people cannot handle American motors in the right way, for they have nearly always trouble with American engines; engines, which have proved to be the best in the world as long as they are in America. They will stay for 300 hours in the air, they will cross the Atlantic, but then, as soon as an European mechanic or engineer looks at the poor motor, the trouble begins. But, if the American motor is touring Europe with an American pilot and American mechanic, he is all right. I think your motors cannot support the subsidized gaze in the eyes of our airline mechanics."

This situation obtains also on the other continents. Our engine suppliers, if they are to be successful overseas, must make adequate provision for the instruction of native service men.

At present we have no plane which will compete with the new Junkers four-engined G.38 in purported lifting capacity. This plane, which should (if the initial flight tests are an indication) carry a payload of three tons with a cruising radius of over 2,000 miles, will be sold for not less than $100,000. There will be few purchasers for the present, for it does not appear that traffic will now warrant the use of such large planes.

There are other German types making a bid for a place in the international trade of aeronautic products. The new Junkers Junior, a light two-seater of orthodox Junkers construction, will be available soon in competition with our

(*Continued on page 266*)

THIS YEAR OF GRACE

By Don Rose

It is a pleasant habit among men to wish each other a Happy New Year, and a healthy and happy arrangement of the calendar which gives us an occasion to do so. At other seasons we are, unfortunately, more likely to wish each other adenoids, fallen arches and a pain in the neck, human nature having not as yet progressed so far that it can stand the strain of competition in business, love, poker and other temptations, without leaking a little at the seams. But once a year, at least, we wish each other a Happy New Year and mean it.

Fortunately, we are rarely called up to define just what we mean by this friendly and seasonable greeting. Most of us have only the haziest idea of what happiness is anyway, and would certainly make a poor job of picking it for somebody else. The most we know of it is that it is the only thing in life worth working and waiting for, the surprise package which we usually hunt for in the wrong place, the pot of gold at the other end of every rainbow. Some of us stumble over it without half trying; some of us spend a lifetime looking for it and find it elusive as an eel in a barrel of grease. Some of us miss it by looking too far ahead for it; some of us pass it by because our noses are too close to the rut in the road. And nobody has yet discovered where it can be bought, or could tell another where to look for it.

But we wish each other a Happy New Year, and it's an excellent thing to do. It amounts to a sort of chorus once a year of optimism and good faith and a conviction that everything will be all right if we wait long enough and work hard enough. This exchange of greetings is like a hitching up of our spiritual breeches, and we all feel better for it. It braces us all for another round with our private and particular enemy, and reassures us that some of the neighbors are rooting for us in the knock-down-and-drag-'em-out fight which we call life. It's a stimulus for good intentions, a jolt to the ambition, and a tonic for weak nerves and stomachs. So a Happy New Year to everybody, from the Department of Commerce to the last grease-monkey on the world's worst flying field.

There stretches before us all a new year of grace, come out of nowhere and raw material for whatever we choose to make of it. Nobody ever saw it before, and nobody yet knows what it will be good for. For reasons beyond our comprehension, we are all blind as bats about tomorrow, even though we spend so much of our time worrying about it. But one thing we know by testimony of common sense and experience. The tone and tune of tomorrow will be settled not so much by what happens as by the way we take it. We take it with good cheer and courage, and it's a good year—no matter what the newspapers say. We take it badly, and it's soured all through with disappointment and discouragement.

You may say that Pollyanna invented this philosophy, and that it's applesauce. By your leave, I insist that it works. It's not more than a couple of months since Wall Street woke up one morning to find that somebody had stolen its suspenders. Everything that seemed important began to slip and slide. Except for the lack of trumpets, it looked like the end of the world, and every timid soul went looking for a cyclone cellar. And what happened?

Well, President Hoover sent word to the neighbors, and they got together and there was considerable talking. Later the visitors went home and did some more talking. They talked good cheer and courage and the old-fashioned idea that everything was going to be all right. In about three weeks everybody was believing it. More important still, they were acting on it, so that Christmas was the same gay and glorious and spendthrift occasion that it usually is and should be. The gloom and fear and calamity just dried up and blew away. Check me by the trade statistics for the end of the year and see if I'm wrong.

You may not care much for President Hoover's taste in neckties or his notion as to what makes a man an enemy of society. But you must hand it to him, and to those who worked with him, that he's a first class poker player. He drew a bad hand and played it so well that nobody called him. He changed the mood of the nation when it was dead set on misery. And he did it all with talk. Nothing in the world but talk. All the big figures and construction projects and prosperity programs which rattled around in the early December newspapers were just talk. You can take them apart and find that they represent little more than the normal program of this busy country, which reaches the million mark in every commodity which it makes and uses. The trick was to talk about them, when the pessimists and prophets of gloom were trying their darndest to talk about something unpleasant, and it worked so well that the nation forgot it was ruined. When the economists get back their breath, they are going to tell us that never in history has this nation bounced so quickly out of the dumps and got back so completely into its stride after a stock market storm. And optimism, expertly applied where it was most needed, turned the trick.

So when we count on a happy new year for the aviation industry, we are talking business. So help me Lindbergh, we need this sort of optimism just now. We need to press our luck, bid our hands for all they are worth, and look for three kings and an ace in the dummy. Otherwise the goblins are going to get us, just when we are nearly past the dark place on the road.

All the history of aviation is on the side of optimism. No business in the world ever had so many good breaks, whether it deserved them or not. Some of them were earned, and some of them just happened. The stars in their courses were on our side, or something. Ever since a young man came out of the west and stole all the front pages of the newspapers for our favorite industry, the unexpected has played right into the hands of the flying men. It will probably keep on doing so for a long time to come.

Somebody has said that the last reliable prophet went out of business when Balaam's ass died, but anticipation of what comes next is still one of the favorite forms of solitaire. It's not an easy game, and half the time a good guess works as well as a yard and a half of careful calculations. But since I'm not selling stock in anything, nobody need take my opinions more seriously than seems absolutely necessary, so here goes.

This year of grace is earmarked for the biggest production record of aeronautical history. I know just as well as you do that the bogey of overproduction went wandering around the country last fall and scared some of the brothers half to death. But the times have changed, as they will if you don't watch them. For one thing, it's on the books that the number of available airports will nearly double during the next twelve months. For another, increased production is cutting the cost of airplanes which can be trusted to do what they are told. For a third, an airplane is becoming part

(*Continued on page* 218)

ASIATIC AVIATION

By Craig Kennedy

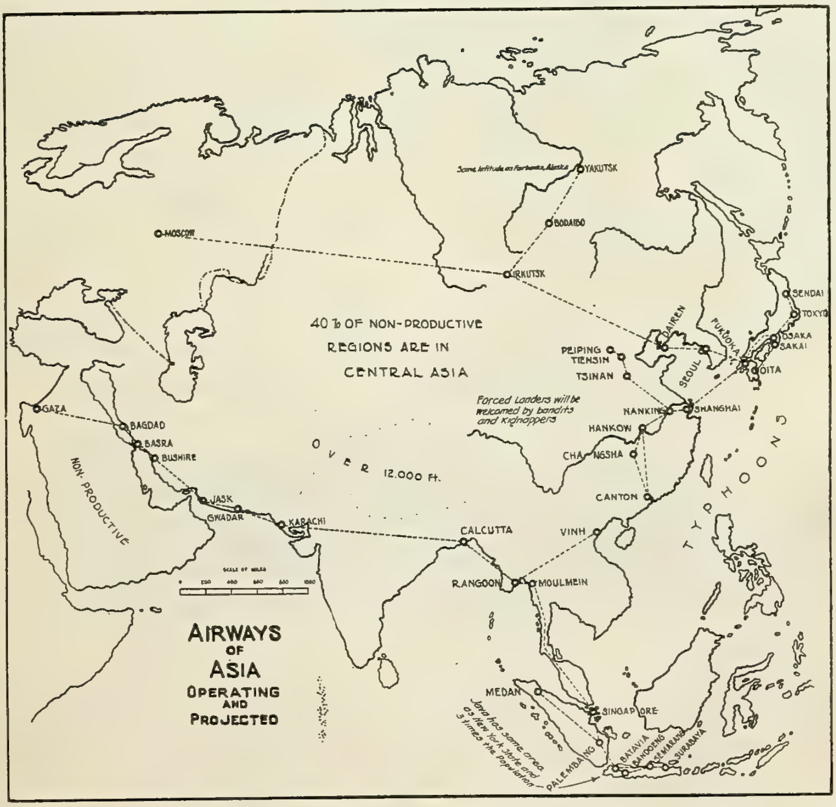
Lack of adequate landing fields is the biggest handicap.

THE dawn of 1930 finds air transportation in Asia in the same struggling stage that the new 1926 found it in the United States. Those who have not had the good fortune, or misfortune, of seeing some of the Orient may not appreciate the absurdity of the situation. In almost every other field 1826 would afford a sufficiently close comparison.

To visualize both present and future operations, one must picture aviation on the biggest and most populous continent divided into two zones. The southern zone centers around Dutch, British, and French possessions; the northen comprises Japan and parts of Siberia and China. In the south we have three of the four most air-minded European nations; in the north, striding Japan, bulging Russia, and restless China. With the exception of the last two, all of these nations are interested in Asia's air for reasons beyond the sea. Air-mindedness and colony-consciousness are spurring each other. Aviation balance sheets may well include colonies as a good-will item, and colonial statements may do the same with aviation.

The Dutch and English are demonstrating the advantages of establishing and operating air routes. The former ferried airplanes from Holland, and in November 1928, established service in Java and gave Asia its first well-organized system of air transportation. On their routes, Batavia to Bandoeng and Semarang, they carried 3,800 passengers on scheduled flights and 1,500 passengers on special flights during the first six months of 1929. Of 1,400 scheduled flights during this period, there were only three cancellations and these because of weather. The equipment consists of Holland Fokkers with Armstrong-Siddeley engines. Using Batavia as a junction, the service will soon include Palembang, Medan; Singapore, Surabaya.

The K. L. M. (Royal Dutch Air Lines), under a $400,000 subsidy, is attempting a fortnightly service with trimotored Fokkers between Holland and the Dutch East Indies. Heavy summer rains prevailing over part of the route and the need for equipment at home during the busy seasons, limit operations over this line to the winter months. The first trips were made during the winter of 1928 to 1929 and were resumed in September 1929 for the present season.



AIRWAYS OF ASIA OPERATING AND PROJECTED

The Imperial Airways mail and passenger service from London to Karachi, India, was inaugurated in April 1929, and mail increased sixty per cent a few months later. The journey involves the use of landplanes and flying boats, and includes a short overnight train passage. The weekly schedule accounts for 50,000 Imperial Airways miles per month. New equipment contemplated includes 40-passenger, four-engined, 2,000-horsepower Handley-Page ships. Fields are now being prepared along an airway to Singapore, and the realization of the Australian objective will bring every important part of the Empire as close to the homeland as Canada.

The English route is the key to Dutch and French lines, both of which now hold extensive concessions. On the Singapore-Australian line, the English will look to the Dutch for help and their arrangements with France should approach a merger of interests. By giving France rights on her Asiatic airways, England obtains concessions on the desirable French airlines in Africa. Future exchanges may be made when activities commence in adjacent French and English possessions in southeastern Asia. France is making her Oriental start with a Rangoon-Vink line.

Now let us view the indigenous aviation. Here we find that the Japanese were offered an intermittent service by the Eastern and Western Aviation Company and the Japanese Aviation Company from 1925 to 1928. The Japanese Air Transport Company, organized in 1928 with an authorized capital of $4,600,000 and a subsidy of approximately $10,000,000 covering an eleven-year period, absorbed the two pioneers. The government guarantees eight per cent dividends and denies the stock to foreign companies. In addition, it is lighting routes and offering weather service. The young company has a fleet of about fifty planes. It ordered twenty-one from the Fokker Aircraft Corporation of America and six from the Dutch Fokker plant, nearly all of which have been received.

Japanese routes include Tokio to Dairen via Osaka, Fukuoka, and Seoul; Tokio to Sendai; Oita to Sakai; Osaka to Bettu; Fukuoka to Shanghai. The last is probably the longest oversea

(*Continued on page* 226)

"GO SOUTH, YOUNG MAN!"

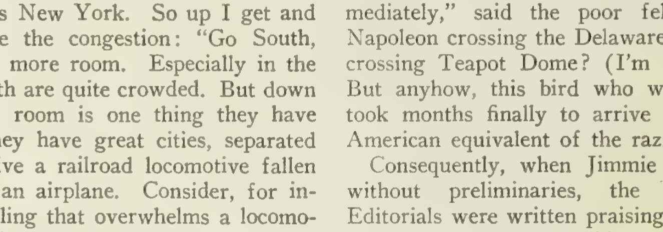
By

Cy Caldwell

IT WAS Horace Greeley who said, "Go West, young man!" He had been trying to battle his way into a Van Cortlandt Park Express in the Times Square subway station when it suddenly occurred to him that New York was slightly crowded. Nobody had ever noticed it before, being too hurried to notice anything. But Greeley, the man who won fame by saying, "Wait until you see the whites of their eyes, then run," decided that something should be done to alleviate the miseries of a subway rush hour, so he said, "Go West, or go to — " Anyhow, get out of his way; that's what he meant. And a lot of them did go West, and are now extras at Hollywood.

And now the time has come for Greeley to sound his clarion call again; only, it wouldn't do much good, for the West is now as crowded as New York. So up I get and pull a new one to relieve the congestion: "Go South, young man!" and give me more room. Especially in the subway and in aviation; both are quite crowded. But down South, in South America, room is one thing they have nothing else but. And they have great cities, separated by natural barriers that give a railroad locomotive fallen arches but are nothing to an airplane. Consider, for instance, the discouraged feeling that overwhelms a locomotive forced, against its will, to drag a train across the Andes, which separate Buenos Aires from Santiago, Chile, birthplace of that great patriot, Con Carne, whose coldness to the ladies is immortalized in the poem, "Why be so Chile Con Carne?" The poor locomotive, puffing and groaning, must drag the cars up to a high point of 13,082 feet, 3 inches, above sea level, as measured by a cook on the dining car. The Society for the Prevention of Cruel Climbs to Locomotives has protested against this outrage, and has recommended that airplanes be used instead.

Natural barriers and great distances favor the use of the airplane for travel; and this fact the South Americans have realized, very largely through the efforts of North American pilots who have done such excellent pioneer work in that country. To Fowler W. Barker of the Department of Commerce I am indebted for facts about some of these pilots; and in the brief space of this article I shall mention their work in the hope that it may spur other pilots from this country to go South, and relieve the congestion on the Mineola and Garden City locals of the Long Island Railroad.



Over a pass in the Andes: Mount Aconcagua in the background

One man who has flown into the affections of our southern neighbors is Lieut. James H. Doolittle of the U. S. Army Air Corps. They call him Jimmie down there, and credit him with accomplishing more toward popularizing aviation on the continent than any other individual. His remarkable demonstrations in a Curtiss Hawk, his two flying tours of South America, his flight across the Andes with two broken ankles still in plaster casts or bandages, his unheralded flight from Assumpaco to Rio de Janeiro, have won him enduring fame.

The flight from Assumpaco to Rio is 900 miles, most of it over uninhabited territory, where a forced landing would probably have meant a crash and several weeks of walking to get out. The outstanding feature of that flight was that it was unannounced beforehand. The newspapers had been treated to announcements by many pilots of proposed sensational flights, none of which had turned out as advertised. Then Jimmie simply took off, flew, and arrived; thus violating what before had amounted to a tradition in South American aviation. Until that flight the newspapers had come to believe that no airplane could go anywhere without a lot of preliminary publicity blah.

One bird, for instance, left by boat for Portugal for the purpose of flying back to Brazil. "I go to return immediately," said the poor fellow, trying to look like Napoleon crossing the Delaware—or was it Harry Sinclair crossing Teapot Dome? (I'm a little weak on history.) But anyhow, this bird who went to return immediately took months finally to arrive in Rio, getting the South American equivalent of the razzberry.

Consequently, when Jimmie Doolittle pulled his stunt without preliminaries, the papers were entranced. Editorials were written praising his modest way of merely doing things without talking about them, and he stepped quietly and modestly into a place of high esteem. "He flew alone without advertising, as if it were the most natural thing in the world!" exclaims one editor. "He left Assumpaco with the intention of dining with a friend in Rio—and he dined with him. This feat caused such astonishment to the press service that it was only after twenty-four hours that they remembered to send us the news."

Brazil has its Santos Dumont, Colombia its Benjamin Mendez, Argentina its Claudio Mejia, but with these national heroes Doolittle stands just as highly in the affections of the people. He has been a real ambassador of good-will to South America. His partner in this work has been that quiet unassuming pilot, Mac of Curtiss, otherwise Mr. Bill McMullen, who has spent two years in Chile and the Argentine, getting acquainted and demonstrating Curtiss ships. Mac has been there so long he speaks the language like a native with adenoids and can order his drinks in the parent tongue. And he can always get exactly what he orders, if he repeats it in English.

He mentions an odd fact in a recent letter to me: "There is a ruling in Chile prohibiting the taking of photos from the air. The Pan American-Grace Airways that bring the mail down the coast are required to carry a Chilean army pilot to observe that the regular pilot follows the regular route and that no photos are taken. I have heard that the Chilean government is now going to require that an observer be carried on the ships coming over the hills."

The official mind, in all countries, works in a mysterious way its wonders to perform. What use, outside of the

Personnel of the Army Pan-American flight

In oval, three Loenings of the Army flight

picturesque, could be made of photographs of a flock of mountains is not apparent. The ruling is just one of those things. And, of course, like prohibition up here, it doesn't prohibit. I have a dozen pictures of those mountains, taken by a passenger who shall be nameless, for he may want to go back there some time. He snapped them with a small camera while the army pilot wasn't looking. That just goes to show.

Eight or nine years ago Elmer Fawcett was in Peru with a wrecked plane deserted by the pilot for whom he was a mechanic. In a strange land, with slight knowledge of the language, there seemed to him only one way to keep from starving—to repair the airplane and fly it. Since there was no one to teach him, he taught himself. Now, after years of struggle for existence, he has made his name synonymous with commercial aviation in Peru, and has the faith of the country that adopted him. He carried a great many passengers in the original old patched up crate, without injury to a passenger, and now has modern equipment and is operating an airline under government concession twice a week between Lima and Talara.

Peru is also the scene of the aerial activities of that famous bug-hunter, Captain Harold R. Harris, who used to fly the Barling Bomber, after which no labor was too arduous for him. In Peru he dusted the cotton crop of the Canete Valley, causing consternation and despair to break out in the weevil colony, but advancing aviation so far that the Peruvian navy now runs an airline from Lima, over the Andes at 10,000 feet, to Iquitos at the headwaters of the Amazon. This 600-mile journey is made in from six to ten hours' flying time, depending on the wind, as compared to eighteen days to a month by pack mule, the only other available means of communication to and from the capital to the copper-mining center. Mail amounting to 400 pounds is carried on each trip, and passengers must book passage weeks in advance. Captain H. B. Grow, formerly of the U. S. Naval Mission to Peru and now Director-General of Aviation for the Peruvian government, was instrumental in the inauguration of this line.

When you consider that an airplane can do comfortably in six hours what it takes a flea-bitten mule three weeks to do, you get an idea of the future of aviation in South America. Airplane development in North America is retarded by existing means of transportation that are fast and comfortable. Lima to Iquitos, for instance, is about the distance of New York to Detroit, which the *Detroiter* of the New York Central and Michigan Central covers between six at night and nine in the morning. But the Peruvian equivalent of the *Detroiter* between Lima and Iquitos is a mule with a mean disposition. Anyone who has wrapped his legs about a mule for three weeks in order to cover that distance, doesn't have to be argued with much to be induced into an airplane to cover the same distance in a few hours. That man is sold on aviation; the mule sold him. If we could just substitute mules for trains up here, air travel would pick up enormously. But since we can't do it, one thing to do is to go where the mule is already working, and try to supplant him. He'll be grateful.

Don't get the idea that people in South America ride around only on mules; there is excellent train service throughout much of the country. But there is enough territory left where a train can't go profitably, because of construction costs, to make a wonderful field for airplanes. In Bolivia, for example, Junkers planes are making, on regular schedule, flights of two and a half hours that take six days on mule back. Six days on a reluctant mule are enough to convert even a standard admiral to air travel. The Scadta line, in Colombia, flies from Baranquilla to Girardot, following 625 miles of the Magdalena River, with Junkers on floats and Dornier-Wals. This trip is made in seven hours and takes seven days by river steamer; and sometimes the steamer takes longer, for if it gets stuck it may have to wait for the next big rain to float it off. On those boats the passengers take along fishing tackle and mosquito netting.

There was a fellow in Bogota who had his fiancée come in by boat. The boat got stuck for a week, during which time the girl fell in love with and married a fellow passenger. She said that she simply had to do something to pass the time. Now, there was one fellow who would have saved himself a lot of suffering if he'd taken the airplane instead of the boat. That's one thing you can say for airplanes that you can't say for boats: you aren't thrown with a woman long enough for her to do you any permanent injury.

Another North American who has contributed a lot to aviation below the equator is Lieut. Leigh Wade, who has the Order of the Rising Sun from Japan, the D.S.M., an honorary Master of Science Degree, and is a Chevalier in the Legion of Honor because of his participation in the Army's 'round-the-world flight. He was in South America last year with a Consolidated Husky and has recently returned there again. He flew through Peru, Chile, the Argentine, and Brazil. He was the first man to cross the Andes in a training plane. When he took off from Buenos Aires to go north to Rio he was told that his ship could not make it because it did not have sufficient cruising range, and there were no landing fields en route. He put on an extra tank to increase his range, and then had three forced landings within a hundred miles of Buenos Aires,

Lieut. Jimmie Doolittle

thereby locating three emergency fields which were not only suitable for landing but also for a successful take-off. In Brazil he and Doolittle performed on Bastille Day, in honor of the French Colony. This day commemorates a lot of French ancestors' getting out of jail, you know; they were supposed to be political prisoners who were let out, but at the same time a lot of Frenchmen got out who had been put in for getting too familiar with some other Frenchman's purse or his horse. You know how it is when they have those jail breaks in a revolution—not only the politicians, but also the regular acknowledged crooks, skin out.

Well anyhow, up went Leigh and Jimmie to perform for the descendants; and up went a flock of French naval aviators in a very loose formation. Fifty thousand Frenchmen can't be wrong, but six of them in a naval formation can be all wet, as they proceeded to prove to the consternation of the French mission on the ground. While they wandered sedately around, half a mile apart, Leigh and Jimmie were casually cutting didoes in the approved Army manner and walking off with the show. A little difficulty sometimes presented itself when native pilots would try to imitate the feats of those two; they would go through the maneuvers all right, only instead of straightening out when they were near the ground the straightening out used to get left to the undertaker. It had to be explained gently to the local boys that not even up North did many pilots imitate Doolittle exactly.

Another expatriated Gringo is Orton Hoover, who holds the rank of Colonel in the Sao Paulo militia. Right after the war he flew there for the Curtiss company, using Jennies, until he later got some Whirlwind-powered Keystones. He has about as much time in the air over South America as any pilot, regardless of nationality, for he was in Brazil as a Curtiss representative even before the war. The aviation development in the important state of Sao Paulo may be attributed largely to Hoover's flying ability, hard work, and his understanding of the Latin temperament, which I believe takes some understanding on the part of a Northerner, just as the Northerner takes some understanding by the Southerner.

Captain Ralph O'Neill, U. S. Army Air Service ace in the war, and later chief aviation instructor for the Mexican Air Forces, was responsible for the Argentine mail contract awarded the New York, Rio and Buenos Aires Line, which has placed an order for six multimotored flying boats, each capable of carrying a payload equivalent to the weight of thirty-two passengers. He surveyed a good part of the route between Rio and the Guianas on the east coast.

William McMullen

Lieut. Leigh Wade

Dan Tobin has had a varied career in South America, first at cotton dusting with Harris in the Canete Valley of Peru, then in the employ of Pan American-Grace Airways, still later with Elmer Fawcett, and now as representative of the Curtiss company. He once had a forced landing in the Inca territory in the region of the headwaters of the Amazon River. The Indians, not liking the look of the queer bird that had dropped down among them, proceeded to shoot arrows at it, until Tobin with the help of a pleasing Irish personality managed to make friends with them.

Captain J. W. Davis, Jr., former Marine Corps flier, now the Department of Commerce aeronautic specialist in Brazil, has accomplished some valuable work for the operators who are engaged in connecting North and South America by airlines. He also uncovered some worth-while opportunities for United States airplane manufacturers, many of whom regard the youthful appearing but experienced pilot and salesman as their representative in Brazil. The Government would do well to secure the services of more men like Captain Davis and send them to South America.

In addition to the men on the ground, those who lived in South America, valuable work has been done by Major Dargue and his companions of the Pan American goodwill flight of the Army, and by Colonel Lindbergh, who flew the Caribbean circuit touching Bogota, Colombia, and Venezuela.

The results of these pioneering efforts are the fine airlines now operating in South America; without those efforts, the lines would not have arrived or would not have arrived when they did. But 1930 is only the start of aviation in South America. There is much more pioneering work to be done than already has been done. The two main lines from North America, Pan American on the west coast and New York, Rio, and Buenos on the east coast, are no more than the beginning of things aeronautical. Feeder lines by the dozen will be needed to link the coast lines with the interior cities. And in that work there will be plenty of room for North American pilots and business men who are qualified to carry it on.

All of which should alleviate the congestion in the Northern Hemisphere, if only some of the boys will go

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The FUTURE of AERONAUTIC EXPORTS

By Francis H. Love

President, United Aircraft Exports, Inc.

THE present favorable position occupied by American aircraft and accessory manufacturers in the export field is probably in a great part the result of the fact that the aircraft manufacturers are profiting by the comparatively recent experience of the automobile manufacturers who at first endeavored to force export sales in spite of the absence of foreign demand and necessary servicing facilities. There was a time, I recall, when consignments of automobiles were shipped to out-of-the-way foreign cities where there was not even a chauffeur capable of operating an automobile. Also, in some foreign shipments, there were cars that were considered as having some slight inherent defects which made them unsuitable for the domestic market.

Vought seaplane used in the Peruvian naval air service

Fortunately, such practices are being avoided in the export of aeronautical equipment. Any reputable manufacturer will refuse to ship a plane abroad unless he can be assured that there are capable pilots to operate it and that there are at least a limited quantity of engine and plane spare parts available. Moreover, he will insist that the planes exported be inspected even more carefully, if possible, than those for sale in the domestic market. Aircraft manufacturers are also avoiding the granting of miscellaneous agency requests and are proceeding very slowly in disposing of export sales franchises—their purpose being to find only sound reputable houses which will be permanent connections.

The United States has a singular advantage in manufacturing aircraft for export, in that within the confines of our own country we have almost every operating condition, climatic and otherwise, which would be encountered elsewhere in the world. For example, one of the planes manufactured by the United group, the Wasp-powered Hamilton Metalplane, has been successfully operated on floats in tropical waters, on wheels in the Northern states, and on skis in Alaska. This type of ship is, naturally, from its versatility, not merely salable, but has been sold and is being used in Siberia, in Panama and in the mountain regions of northern Italy.

Boeing, another manufacturer of the United group, builds planes especially designed for service on a mail line which necessitates flying from sea level at San Francisco over the Rocky Mountains to Chicago. Naturally, such planes would give excellent performance when used for flying from sea level in Chile over the Andes Mountains to Buenos Aires. The combination of mail lines with manufacturing units such as exist in the United group, operating two of the longest mail lines in the world, automatically furnishes the most practical kind of testing laboratory possible.

It is not reasonable to assume that present types of aircraft, or of engines, are the ultimate in design and construction; on the contrary, it is safe to predict that there will be continuous modifications and improvements for some little time to come. In view of this continuous evolution, aircraft manufacturers are again profiting by the experience of automobile manufacturers, and instead of going into excessive volume production, are manufacturing for immediate requirements. When types are felt to be as nearly fundamentally right as possible, there will undoubtedly be mass production, with consequent lowering of prices.

The greater extent of the American domestic market, when compared with the individual market of any foreign manufacturer, will unquestionably enable aircraft manufacturers in this country to go into volume production impractical to foreign competitors; and when this condition becomes possible, it is reasonable to suppose that the economies of mass production will be reflected in retail selling prices, enabling American equipment in the export field to compete very favorably on a price basis.

At the present time many foreign countries, especially

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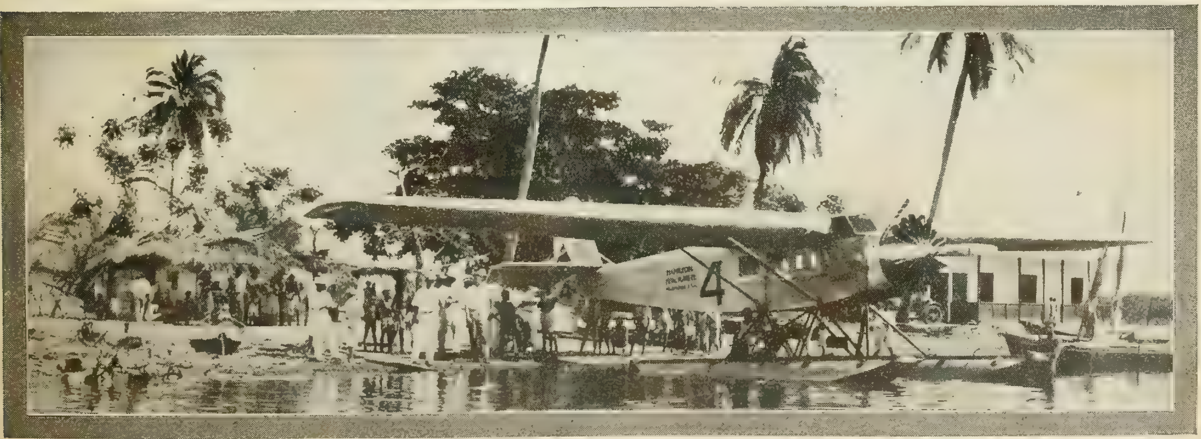
Hornet-powered Hamilton all-metal monoplane equipped with floats for service in tropical waters

FLYING IN CENTRAL AFRICA

By R. A. Logan

ONE evening in November 1927, another man and I were sitting in a hut made of sun-dried bricks with a thatched roof. The floor was of mud and everything was raised off of it by bricks or metal to prevent destruction by white ants. A bed in one corner was covered with a heavy net to keep out malaria-bearing mosquitos, and scorpions that occasionally dropped from the roof. Near a window was a table supporting a portable short-wave radio transmitter and receiver. Thousands of flying ants were keeping up a mournful tattoo bumping against the window-screens; the night was inky black with frequent vivid flashes of lightning; a steady rain was falling. We were in Central Africa.

We were using a fifteen-foot inside aerial without any connection to the earth, and in spite of the thunderstorm just over the border in the Belgian Congo, there was little static and many stations were coming through. We had occasionally listened to short-wave broadcasting stations in Europe, but this night we heard a new one, and because the first words we heard were "air survey," we decided to tune in properly and listen.

We heard a voice in London clearly and loudly telling the world at large that the holders of a large mining concession in Northern Rhodesia had decided to use airplanes to enable their geologists to make visual reconnaissances of their territory, and to carry out aerial photographic surveys. It stated that an expedition had been organized in England and that for several months two DH-9 airplanes with Nimbus engines and Eagle aerial cameras had been in active operation.

Zambezi River gorge below Victoria Falls

Our interest became more intense as the voice went on to say that the headquarters of the expedition were in a little mining camp, in the dense bush of tropical Africa, bearing the name of N'Changa—then we knew to whom the voice was referring, for we were at that moment in N'Changa.

The speaker went on to give the names and brief histories of some of the members of the expedition who had gone from England and stated that the latest addition to the personnel of the expedition was a man who had been a Canadian land surveyor before the war, a pilot for three years during the war and for several years with the Fairchild Aerial Surveys of New York after the war—the name given was mine.

Had a copy of the speech been mailed to us it would have been three and a half to four and a half weeks before we could have received it. The letter would have gone by mail steamer from Southampton to Cape Town; then by a forty-inch gauge railroad northward; across the waste-lands of the Karroo; through the diamond fields of Kimberley; past the battle fields of Mafeking and the many places that made history during the Boer war; through the Union of South Africa, into Bechuanaland Protectorate, keeping to the eastward of the Kalaharia Desert where the wild bushmen have the camel's ability to do without water; into Rhodesia, the land of prehistoric ruins (and new American automobiles); over what is called the longest section of straight railroad track in the world—78 miles of it—past the coal mines of Wankies where it is claimed to be so hot that when an extra deep shaft enabled the Chief Stoker of Hades to come up he stayed only half a day and then went home to cool off; under the bank of red mist hanging over the bridge just below Victoria Falls where the train crosses the Zambezi at sunrise.

Then on through the forests and across the prairies of Northern Rhodesia; past the mines of Broken Hill, where the discovery of the bones of ancient man so excited scientists a few years ago; past Bwana M'Kabwa to the little frontier town of Ndola on the southern border of the Belgian Congo; thence by motor truck for a hundred miles over a road winding through the forest, and between anthills fifteen to twenty feet high and twice that in diameter, where natives carry spears by day and lions roar by night, and snakes and lizards warm themselves where the sun is shining bright; where the bush is full of leopards, where monkeys fill the trees; where the air is full of flying-ants and the ground is full of fleas; until at last it would arrive at the copper-mining camp of N'Changa. The route traversed by the letter would be exactly that followed by all members of the aerial survey expedition.

The Congo River flows into the Atlantic Ocean and the Zambezi River into the Indian Ocean, but the watershed between their upper tributaries is in South Central Africa on a plateau 4,000 to 5,000 feet above sea level. The crest of this watershed forms the international boundary between the Belgian Congo and the British colony of Northern Rhodesia.

On the Belgian side of the line are many very rich copper mines. On the Rhodesian side there are extensive deposits of copper ore—perhaps not so rich, but very valuable nevertheless. In the past, various important finds were made by investigating ancient workings of some prehistoric people who have left little trace for identification, but who mined not only copper, but millions of dollars worth of gold as well.

Modern mining-concession holders do not depend on the re-discoveries of the ancient workings but are making definite detailed geological surveys of their holdings.

Although much of the interior of Africa is Belgian and British territory, the majority of the developments of the natural resources have been in the hands of American and Canadian mining and mechanical experts. This applies to all copper mining operations. In Northern Rhodesia nearly all the

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The FUNCTION of AIRCRAFT RADIO

This is the first of a series of articles on Aircraft Radio, written exclusively for Aero Digest

By

Herbert Hoover Jr

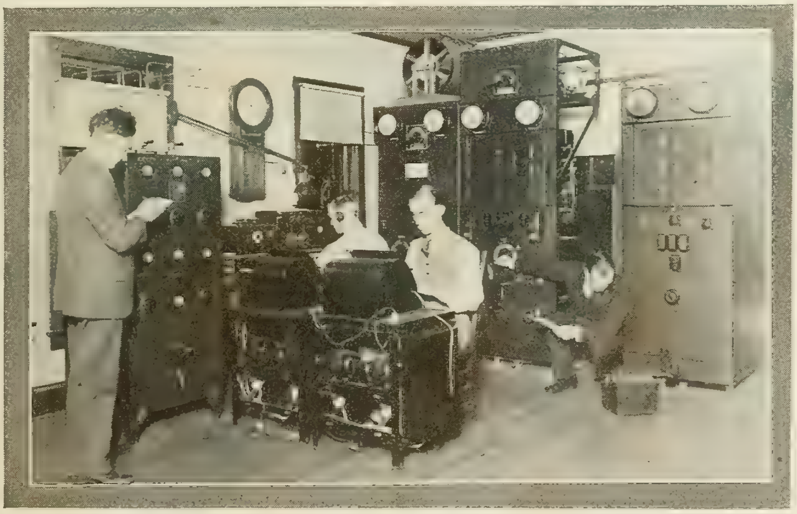
Radio Technician
Western Air Express

THAT radio is going to play an increasingly important part in aviation is a generally acknowledged fact. The Department of Commerce has already installed and is operating a country-wide network of voice broadcasting stations devoted exclusively to aviation weather information. It is also rapidly extending its system of radio beam stations to cover practically all of the major airways.

Radio is eventually going to give to commercial air transportation just that added degree of positive safety and regularity of service which characterizes well operated railroads. The transport companies are spending large amounts of time and money in developing two-way radio communication with their planes, and in applying the latest devices for radio navigation.

It is going to give private and sport flying an added protection and stimulus which it now needs so badly. Light and efficient receiving sets are now on the market that will enable any plane, no matter how large or small, to take full advantage of the weather and beacon services provided by the Department of Commerce. No radio experience is required to use them, and in general they are easier to operate than an ordinary broadcast receiving set at home.

The general public is either going to make or break aviation. The airplane operators and manufacturers have a definite product which they must sell in an open and highly competative market. That product is transportation, and their chief competitors are the railroads, steamships, buses and automobiles. They have the best of pilots, reliable motors, stable airplanes, capable executives, and extensive ground organizations. The manufacturers have had steadily decreasing prices, while the transport operators have constantly reduced their rates. This has all been due to more efficient and intelligent construction and operation, and there is little doubt but that plane transport prices and rates will continue to decline in the future. In fact several large transport companies are now quoting rates which are the same as, or less than, those charged for railroad-plus-Pullman over the same distances—and the bottom is not yet in sight. *But no amount of operating efficiency and price-cutting is going to produce a large volume of business until public confidence in air transportation has first been gained.*



Weather broadcasting station used in conjunction with the radio directional transmitting installation at Cleveland Airport. Left, short-wave transmitter for exchanging weather reports; center, teletype machines; right, long-wave transmitters

It is here that radio is trying to do its share. Just now it is in the spectacular stage. Long-distance contacts and thrilling experiences of flirting with beacon signals and weather reports while in tight weather give all of us a big kick. But that will all wear off soon enough and the real part that radio will play in helping to gain public confidence is going to be the day-in-and-day-out "plugging away behind the scenes" so that airplanes, by their actual performance, may become a real transportation factor.

There are three general classes of service which radio can perform in aviation. These are, first, the collection and dissemination of weather and other pertinent information, second, aids to navigation of planes while in flight, and third, as a means of constant two-way conversation between pilots and their ground organizations.

In all aviation radio there is one point that cannot be stressed too strongly. It applies with equal force to each of the three types of radio service outlined above. It is not enough merely to install a well designed and workable radio on the airplane, and thoroughly to shield and bond the ship; but in addition a complete system of ground radio stations, weather observers, and other specialized personnel must be built up and trained. They, in turn, must all be tied together by some rapid and positive means of communication, and all of their various activities properly coördinated and directed.

The Government, through the Department of Commerce, undertook the initial step in providing a ground network. About forty radio telephone broadcasting stations are being installed along the airways

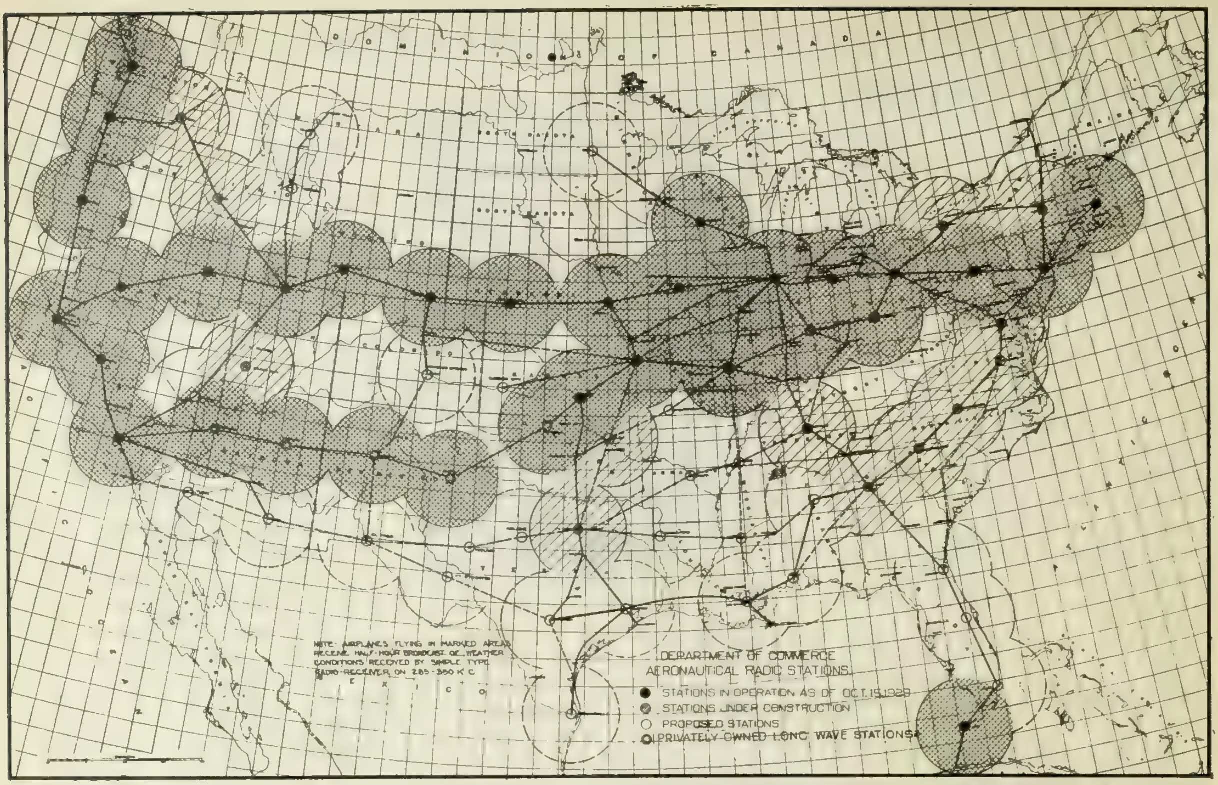

NOTE: AIRPLANES FLYING IN MARKED AREAS RECEIVE HALF-HOUR BROADCAST OF WEATHER CONDITIONS RECEIVED BY SIMPLE TYPE RADIO RECEIVER ON 285-350 K C
DEPARTMENT OF COMMERCE
AERONAUTICAL RADIO STATIONS
● STATIONS IN OPERATION AS OF OCT. 15, 1929
STATIONS UNDER CONSTRUCTION
○ PROPOSED STATIONS
PRIVATELY OWNED LONG WAVE STATIONS

Figure 1. Map showing location and range of aeronautical voice broadcasting stations operated by the Department of Commerce

all over the United States. They transmit on wave-lengths of 800 to 1,050 meters, which is somewhat above the tuning range of an ordinary broadcast receiver. These stations have a reliable minimum daylight range of about 125 miles, although under favorable conditions, particularly at night, they can be heard even up to 600 miles. Figure 1 shows the location of these stations, with circles having a radius of 125 miles drawn around them; the location and wave-length (expressed in kilocycles) of each one is included in the table beneath. Every half hour these stations broadcast a report of general and specific weather conditions in their territory. They are connected together through a network of short-wave radio telegraph stations, and in some cases by land wire teletype circuits. (There are various names for this type of machine such as "simplex," "telephone typewriter," etc. As many of these machines can be connected together by a telephone wire line as may be desired.)

The weather reports and forecasts are in most cases made by the Weather Bureau of the Department of Agriculture and then turned over to the Department of Commerce for dissemination. It is Captain F. C. Hingsburg, Chief Engineer of the Airways Division, Department of Commerce, who has been responsible for developing and installing this great system. The aviation industry owes him a real vote of thanks for this work.

In addition to the weather broadcasting stations, the Airways Division is installing about thirty of the directive radio range beacons along the principal airways of the country. To those pilots who have never used them there seems to be a feeling that there is something mysterious and complicated about them. Nothing could be farther from the truth. In a later article we can go more fully into the theory and methods of operation of the various types of beacons which are now being tried out, but the general principle is simplicity itself. The transmitting station sends out repeatedly a "dot-dash" on one side of the airway, and a "dash-dot" on the other side. The pilot tunes into the station exactly as he would for the voice broadcast of weather, using the same receiving set, and without any change being made in its adjustment. If he is directly on his course, and is therefore receiving the two signals with equal strength, the two code letters blend into one long dash. But if he is to one side or the other, he gets one group more strongly, and he knows that he should swing back to the other side until they again become equal. Figure 2 illustrates graphically how this works. At half-hour intervals the beacon is switched off, and the weather is broadcast on the same wave-length. At present the radio beacons have been installed only as far west as Omaha, but eventually will cover all the major airways of the country. A tentative map drawn up by the Airways Division of the locations proposed

Table Showing Frequencies of Airway Radio Stations and Airway Radio Range Stations Now in Operation

Sign Call	Radio Station	Radio-phone	Radio Range Beacon
KCT	Glendale, Calif. (Los Angeles)	327 k.c.	....
KCU	Fresno, California	350 k.c.	....
KCV	Oakland, California	321 k.c.	....
KCX	Medford, Oregon	344 k.c.	....
KCY	Portland, Oregon	327 k.c.	....
KCZ	Seattle, Washington	338 k.c.	....
KLK	Reno, Nevada	344 k.c.	....
KOJ	Elko, Nevada	315 k.c.	....
KGD	Salt Lake City, Utah	327 k.c.	....
KDN	Rock Springs, Wyoming	350 k.c.	....
KSG	Cheyenne, Wyoming	321 k.c.	....
KVM	North Platte, Nebraska	344 k.c.	306 k.c.
KJF	Omaha, Nebraska	315 k.c.	....
	Des Moines, Iowa		....
KIS	Iowa City, Iowa	327 k.c.	....
	Sterling, Illinois		327 k.c.
	Cicero, Illinois (Chicago)		350 k.c.
KDA	Maywood, Illinois (Chicago)	350 k.c.	....
	Goshen, Indiana		294 k.c.
KRL	Bryan, Ohio	294 k.c.	....
WWO	Cleveland, Ohio	344 k.c.	344 k.c.
WWQ	Bellefonte, Pennsylvania	302 k.c.	302 k.c.
WWU	Hadley Field (New Brunswick, N. J.)	290 k.c.	290 k.c.
WSX	Boston, Massachusetts	321 k.c.	321 k.c.
WEK	Wichita, Kansas	344 k.c.	....
KRC	Kansas City, Missouri	321 k.c.	....
KCQ	St. Louis, Missouri	338 k.c.	....
WSG	La Crosse, Wisconsin	338 k.c.	....
WBP*	Key West, Florida	344 k.c.	....

*No regular schedule at present; station operates only upon request.

for these beacons is shown in Figure 3.

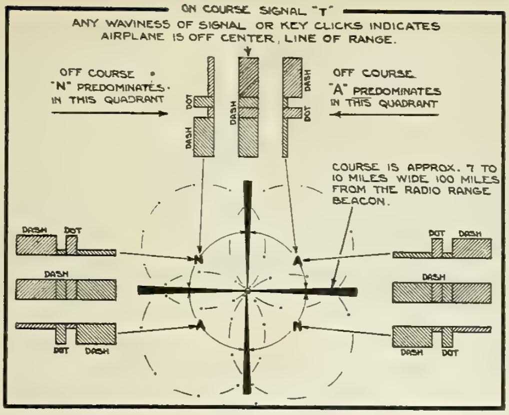

ON COURSE SIGNAL "T"
ANY WAVINESS OF SIGNAL OR KEY CLICKS INDICATES AIRPLANE IS OFF CENTER, LINE OF RANGE.
OFF COURSE "N" PREDOMINATES IN THIS QUADRANT
OFF COURSE "A" PREDOMINATES IN THIS QUADRANT
DOT
DASH
DASH
DASH
DOT
COURSE IS APPROX. 7 TO 10 MILES WIDE 100 MILES FROM THE RADIO RANGE BEACON.
DASH DOT
DASH
DOT DASH
DOT DASH
DASH
DASH DOT
N
A
A
N

Figure 2. Illustration of radio signals marking airway courses. For uniformity and purposes of orientation, quadrants north or northwest have "N" (dash dot) signals. For identification, signals are transmitted in groups of one to twelve signals and in the same manner that a clock tolls time, the station may be identified by counting the number of signals per group.

The Government has therefore provided not only a weather collection and forecasting service on the ground, but also a nationwide system of voice broadcasting stations to give the information to planes while in flight, and a series of radio beacons to guide them along the airways. All that is needed for their reception is a receiving set, a pair of head telephones, and a short antenna. Under these circumstances there is not the slightest excuse for an airplane to get into trouble from lack of knowledge of ground weather conditions, nor to stray unknowingly very far from an airway. Before the end of 1930 I should not be at all surprised to see the Department of Commerce require every passenger and mail ship to carry at least a receiving set, and eventually all such private planes as it has control over as well.

But quite aside from any Government regulation to this effect, every transport company, every professional pilot, and every private flier owes it to himself to make use of this service every time he undertakes to make a cross-country hop. Not only that, but with the general public in a highly critical mood regarding all types of flying, it is a positive obligation upon every pilot, no matter in what branch of flying he may be participating, to guard the good name of the industry against accidents in every way that he possibly can.

The reception of weather reports and beacon signals is only the first step in making use of radio. Two-way radio telephone communication between planes and the ground over relatively long distances is already an accomplished fact, and some of the larger transport companies are making full use of it.

The Department of Commerce stations will not be able to hold two-way communication with all of the radio-equipped planes which will shortly be flying near them. These stations will, of course, maintain watch for planes which are in distress, but it would be physically impossible for them to carry on routine conversations relating to position reports, dispatch messages, and general operations traffic; and at the same time fulfill their major function of broadcasting general weather conditions impartially to everyone.

For these reasons the air transport operators have gone to short waves, and are installing at their own expense a series of ground stations along the airways with which to talk to planes while in flight exclusively. The Federal Radio Commission and the Department of Commerce have coöperated splendidly with the transport companies in working out a satisfactory arrangement.

Radio telephone and telegraph transmitters with a reliable range of over 100 miles have been especially developed for air transport use.

It will not be long before light and compact transmitters will be ready for small planes desiring a more limited range, and airports will be licensed by the Radio Commission to use transmitters of restricted power for two-way communication with incoming ships.

In later articles of this series we go more fully into details of installation, design, and theory of receivers. The problems of engine shielding against ignition interference and the bonding of metal parts in the plane, which are extremely important, will also be discussed. The article next month will deal entirely with the installation, maintenance, and operation of aircraft receiving sets designed to receive from the Department of Commerce stations.

It is hoped that this series may prove of practical assistance to pilots wishing to make use of the radio service now existing, as well as explanatory to those not yet fully aware of the advantages of its use.

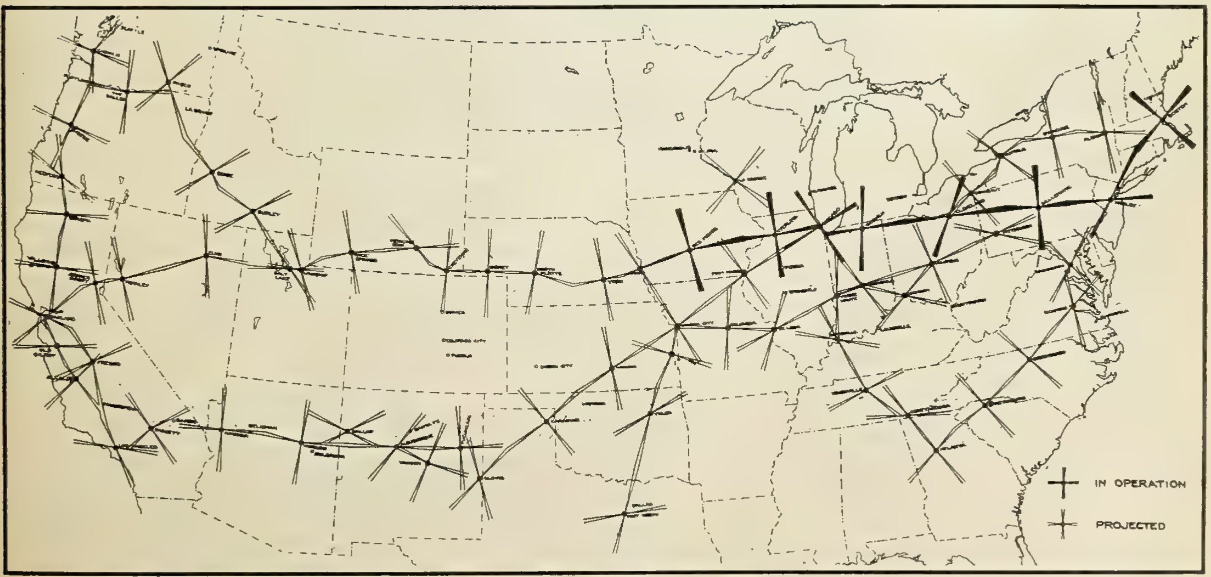


Figure 3. Department of Commerce Airways Division map showing stations of the radio range beacon system

AIR—HOT AND OTHERWISE

Please, Mr. President!
The Air Mail Tangle
Too Many Shows

By Frank A. Tichenor

WHAT goes up must come down, a movement which for a long time has been overdue as far as taxes are concerned. The trouble is that what comes down often descends upon a worthy head. Bandages and the smell of arnica succeeding. That's what has happened with taxes. They went up, Heaven knows. We fully sympathize with President Hoover in his determination to see to it that they respond as soon as possible to the law of economic gravity.

But why let the descending blow fall principally, or even at all, upon the planes of the air services? A developed civilization endeavors to let adults take the hardest whacks. Abuse of infants is an atrocity even in warfare.

While we need money, there has been and is plenty of excuse for reduction of expense in almost every other department of the Government! This terrible assault upon our aviation child, however, seems unjustified and cruel.

The Nation expected economies during Mr. Hoover's administration. Undoubtedly he's going to make them possible, and naturally when he thinks the word "economies" his super-conscious mind perceives a cut upon the Army and the Navy, those famous twins who so persistently have wasted Uncle Samuel's gold dust. Under old regimes it has been the policy always to have ready an Army and a Navy fat enough to be reduced considerably without making them faint and fall. Periodically cut, these two activities strategically have put on fat again after each slicing, so as to be ready for the next reducing diet prescribed.

But they are old and husky individuals—the Army and the Navy. This air activity is an infant, struggling to grow up into a live, big boyhood with a super-powerful maturity in plain sight beyond—a maturity so splendid that when it has been reached it will be able to protect the rest of us in time of danger, as well as serve us all in time of peace.

Habit has something to do with Mr. Hoover's attitude—not his habit, that of the Presidential job. Experience, et cetera, has shown it to be a perfectly wise system to swat, at not infrequent intervals, the cash expenditures for the Army and Navy. In America, as in almost every other nation claiming a civilized society, their expenditures for generations have been almost pathological—a disease. They come and get worse until at intervals, as with the seven-year itch, we, the victims, find ourselves so busy scratching that we don't have time to earn good livings for mother and the children. Then application of "reduction ointment" is a real necessity. So has it always been, and now more than ever since aeronautical development has made old-style Army-Navy methods funny rather than effective.

Obsolescent defense methods obviously should be supplanted with the very best and latest methods of defense in the world's most progressive nation, which can produce without even breathing hard or spitting on its hands the greatest and most necessary industries and the wildest and most unjustified panics that the world ever has known.

To take inventory and throw out the obsolete is necessary, now and then, not only to individual but to Government business. It is not done as often among Governmental as among private business men, because every time you put your finger on the Governmental business man he isn't there, for Governmental business is everybody's business and everybody's business is anybody's and anybody's often becomes nobody's.

An analysis of the proposed Army-Navy cuts leaves one wondering whether the Army Air Corps and Naval Bureau of Aeronautics have not been too drastically sheared. For years the Army and the Navy have been Uncle Samuel's Gold Dust Twins—not advertising his gold dust, consuming it. The two new members of the family, which by comparison ask very little, have not been welcomed to the family. The older twins fear that they'll eat too much and presently supply that which their predecessors claim to, but no longer can, supply.

Assistant Secretary Davison's report as commented on by the newspapers seems to indicate the danger of real famine for our youthful members of Uncle Samuel's defense group. General James E. Fechet brings to the front the fact that the Five-Year Program (which, incidentally, was not permissive but definitely mandatory from the people through Congress) has not even been lived up to. General Fechet says:

"Hindrances to training have resulted due to poor condition of hangars and other essential equipment necessary at flying fields for the purpose of maintenance and protection of aircraft. This condition has become so acute as to be classed as dangerous at some stations such as Kelly Field. Unless funds are made available for temporary repairs pending the permanent construction proposed in the Five-Year Program, this condition will become worse."

General Fechet always is sure of every statement which he makes before he makes it.

We admire Mr. Hoover's efforts to restore confidence in the national financial situation. It was by a stroke of actual genius, producing marvelous immediate results, that he called the great business leaders of America to Washington and put them on the job. It was the first peace time coördination of any nation's business men.

Among those summoned were some of the chiefs of the air industry. All showed themselves intensely anxious to coöperate—to do their parts fully and promptly. But it is not an impropriety for us to direct Mr. Hoover's attention to the fact that the Five-Year Program, if brought up to date as Congress originally planned, using the appropriations which the President has been authorized to ask for, not only would tend to satisfy the public will, as recognized by Congress, but would be a notable measure of relief for the distress which Wall Street and the bankers seem to have thrust on us.

The industry needs this Five-Year Program and definitely needs it now.

Mr. President, why not recommend to the legislative branch immediate procedure with the Five-Year Program. The industry is not in a bad state, but it is young and youth always needs encouragement. Furthermore, real prosperity in any industry helps other industries to be prosperous. The air industry won't long need help, for it grows rapidly in strength; but Government orders this year would mean more than they would next year and far more than they could mean two years from now.

(*Continued on page* 236)

SELLING AIRPLANES ABROAD

By Robert E. Lees

Sales Manager, The Waco Aircraft Company

Chinese Nationalist fliers and a Waco used in the military air force

THE Waco Aircraft Company has always operated under the policy that sales should not necessarily be limited to the boundaries of the United States, and that although selling in certain foreign countries involves acclimation to slightly different customs, experience has nevertheless shown that export selling is not such a mysterious or difficult thing as we are often led to believe.

Selling abroad has been done on terms practically the same as domestic sales; that is, on a strictly cash basis arranged in the form of a letter of credit at the port of shipment, available against shipping documents and invoice. Some business, however, has been handled on the alternative terms, wherein 50 per cent of the purchase price is remitted with order, and the balance on sight-draft with documents at destination.

Loading a crated Waco aboard a Dollar Line steamer

With a few exceptions, most of our foreign business this year has been sales made to governments or government agencies. The Taper-Wing Waco has been the popular model, probably because this plane, though a commercial type, is particularly suitable for conversion to military use. Sales made to foreign governments are handled in a variety of ways. In some cases we have made our contacts directly with a government official who was authorized to make all negotiations and close the deal, arranging for shipping and payment. In other cases, a special agency or bureau has been set up for the express purpose of purchasing airplanes. Sales in these cases were made as though to a company or individual, the government not being a party to it. Again, in some countries a commission or brokerage firm has been the intermediate which conducted the business, the final settlement being made by the government concerned.

The export business for 1930 looks exceedingly bright. There are certain foreign countries which are most ideally suited to the operation of aircraft. Inquiries are being received from individuals in many foreign countries, indicating that airmindedness is spreading rapidly. Many of these inquiries are from automobile importers who see a future in aviation and want to get into it. They are usually well financed and understand the American methods of doing business. Others are interested in airplanes for their individual use, either in business or for pleasure purposes. These are, of course, well-to-do persons who can see the advantage of airplane travel over the long distances between major cities. Some of them are interested in attending American flying schools, with the intention of purchasing an airplane when they have finished the course.

Fleet of Waco Taper-Wings produced for military service in Mexico

Inquiries have been received from all parts of the world, even as far away as India. The majority of the inquiries, however, are from the Spanish-speaking countries. Since actual sales have resulted from many such inquiries, it is an indication that a high percentage of them are of a serious nature and deserve every consideration, in spite of the fact that duplicated inquiries sometimes seem to indicate otherwise.

As in this country, the expansion of foreign business is going to be hampered by the lack of pilots. It is impossible to sell an airplane to a prospect unless he can fly or can

(*Continued on page* 264)

INTRODUCING AMERICAN AIRCRAFT IN FOREIGN COUNTRIES

By Douglas W. Clephane

of the Ryan Aircraft Corporation

THE aircraft industry is not unlike many other new industries. A few of the leaders are looking ahead at conditions which will have to be met five and ten years from now, whereas the majority of manufacturers are so thoroughly engrossed in solving the many perplexing contemporary problems that they do not consider what the future will bring.

This has been particularly true with regard to the aircraft export market. Two years ago, manufacturers did not have to worry about selling airplanes; the most pressing problem then was to produce them rapidly enough to keep up with delivery dates, promised weeks and months previous. It is not surprising that, in this period when capital was hard to get, more companies did not spend money to build up the elaborate export organizations required to sell planes in foreign markets. The warnings issued by the Department of Commerce over two years ago that American manufacturers were overlooking a golden opportunity to secure a foothold in these markets, were to a large extent neglected, so much so in fact that Leighton W. Rogers, chief of the Aeronautics Trade Division of the Bureau of Foreign and Domestic Commerce, told me at that time that one dollar spent then in promoting export sales would accomplish as much as ten spent a few years later. He said that, with the exception of about five companies, this initial dollar was not being spent.

Now, however, with production far in excess of sales in some plants and with all manufacturers devoting more and more attention to sales, the problem of exports is beginning to assume much importance.

Three years ago the Mahoney-Ryan Aircraft Corporation, which is now a unit of the Detroit Aircraft Corporation under the name of the Ryan Aircraft Corporation, saw that, inasmuch as aviation was no different from many other industries, there were eventually bound to be slack periods of domestic demand, and that a foreign market would help to even production over the entire year, as well as increase production so that prices could eventually be lowered. This during a period when purchasers were actually laying on the sales manager's desk certified checks for from $1,000 to $3,000 over the advertised price of the Ryan, conditional upon immediate delivery. Scores of orders were turned down in the weeks following Lindbergh's historic flight because of inability to meet delivery demands. It took a far-sighted policy during this period to enter the export field, but one which has paid large returns.

In considerably less than two years, thirty-six Ryans, valued at $460,000, have been purchased for operation in foreign countries. This is believed to be an unusually good showing in export business, especially in view of the fact that exports of planes to China and Mexico were barred by the United States Department of State for part of this period.

It is a slow, tedious and somewhat expensive process to enter foreign markets. Methods of doing business in South America, Europe and the Orient differ greatly from the policies which bring results in this country. Indeed, foreign business conditions and the temperament of the people vary so much from our own that the average American business man, without realizing it, is liable to do far more harm than good in these countries. Even when the right psychology and methods are applied, results cannot be expected immediately. Some companies have had sales representatives in certain countries for nearly a year without doing one dollar's worth of business. One of these men is probably the best in his field; his company believes that the contacts which he has built up will eventually result in obtaining practically a monopoly of the field as soon as the country is ready for air transportation on a large scale.

There are at least six countries in South America in which the development of the economic resources will depend to a large degree on the introduction of air transportation. For example, Brazil, a country 250,000 square miles larger than the United States, has only about 20,000 miles of railroads compared with 270,000 in this country. Thus, with a population one-fourth greater than that of the United States, it has less than one-tenth the railroad mileage. Bolivia, which has twice the area of the state of Texas, has only about 1,500 miles of railroads, and a trip between Cochabamba and Santa Cruz, only 350 miles apart, requires from twelve to sixteen days by muleback.

Countries such as China, Australia, Russia, Mexico and Canada offer splendid potential prospects for the sale of American planes. Because of the tariff and other barriers, however, it is very hard for American manufacturers to enter European markets or possessions under the flags of European nations.

The first principle upon which the Ryan export business has been built is that of placing foreign sales in the hands of men who are thoroughly acquainted with conditions in the countries in which they will work. Underlying this has been the fact that the Ryan Brougham is adaptable to operation from small rough fields, that it is able to reach an altitude of 25,000 feet, and carry a full load at 18,000 feet, and that repairs and replacements are com-

Left, a Ryan Brougham equipped for service in China; right, unloading a crated plane from a Chinese junk

paratively simple to make. In many cases planes bought for service in foreign countries are operated and serviced by pilots with little or no experience on modern planes. Thus the unusual stability of the Ryan, and the infrequency of major repairs necessary, are strong sales arguments.

If business in these markets is hard to get, it is even harder to keep. Constant contact must be maintained with the government authorities who influence the sales. In many cases factory representatives must give the native pilots and mechanics instruction in piloting and servicing the planes, and prompt and accurate attention must be given at the factory to all orders for parts. The factory representative must ever be watchful for a change in the men who influence sales, and must be willing and ready to aid the country in developing popular interest in aviation.

Skis replace standard landing gears for flying in northern Canada

Ground work by the Ryan Aircraft Corporation is bringing results in many countries. Fifteen Ryans are operating in Mexico, three in Guatemala, three in Canada, and others in Japan, Australia, Italy, England, New Guinea, China and Argentina.

In entering foreign markets, manufacturers are finding that not the least of their troubles lies in keeping the planes operating satisfactorily. Practically all planes sold in the Western Hemisphere by the Ryan Aircraft Corporation are set up by factory representatives who see that the pilots and mechanics are thoroughly trained in the care and operation of the ships. Officials at the home office must always keep in mind that the planes cannot be brought back to the plant for service, and waiting for a replacement will sometimes tie up the operation of the plane for months. Moreover, special equipment is necessary in some cases to meet unusual operating conditions. It is part of the duty of Ryan export representatives to see that each purchaser keeps a supply of parts that are liable to be needed. Furthermore, every effort is made to teach the factory personnel that no major replacements should be needed for at least a year, that every workman must take unusual pride in his part in building these planes for foreign service.

Ancient and modern forms of transportation in Guatemala

The sales representatives must be "Ambassadors of Aviation." They must realize that, particularly in South America, products are bought and not sold. The buyer wants to be a buyer, and government officials object to the high pressure salesmanship methods which have been used by some companies.

Representatives of aviation firms from France, England, Germany and other European countries are thoroughly acquainted with these principles and have had men working on aviation sales in all countries for many years. Unfortunately, although these men have usually been excellent salesmen, they have not always introduced planes which could be operated satisfactorily. In many cases, quantities of obsolete war planes have been unloaded on unsuspecting nations that were just awakening to the possibilities of both military and commercial aviation. This has been particularly true in China. Because of the casualties and trouble resulting from attempts to operate this antiquated equipment, many countries refused for years to make further purchases.

The Ryan Aircraft Corporation was confronted with this problem in entering the Chinese market two years ago. After surveying the entire export situation, officials of the company came to the conclusion that the Chinese market offered the best opportunity for future sales. Although there were quantities of surplus European war planes in China, there was not a single modern plane in the country, and scarcely any that would have been licensed by our Department of Commerce for operation in the United States. There had been so many casualties that quantities of foreign planes purchased had never been uncrated, and as a whole, the Chinese were inclined to regard aviation as "one of those Western marvels" which had no place in their country. Coupled with this was the general attitude of the race. Broadly speaking, the wealthy Chinese rarely show an interest in new projects. In contrast to the Occident where adventure appeals to the mass of people rich and poor alike, in China the customs and philosophy of life of past generations stifle the progress of the people who worship ancestry.

Another factor acting against the introduction of American aircraft in the Orient was that the (*Continued on page* 234)

Group of natives gathered about a Ryan monoplane in New Guinea

CONDITIONS AFFECTING THE AIRCRAFT EXPORT MARKET

By W. F. Potter

Manager, Export Department, Nicholas-Beazley Airplane Co., Inc.

CONSIDERATION of aircraft exports has become very pertinent as the result of a rapidly increasing interest in American aeronautical products among potential buyers overseas. The foreign consumer familiar with American-made products, which, because of the standardized production peculiar to the American industrial system, can be manufactured in large quantities and sold at reasonable prices, are turning to this country as a possible source of supply.

Not by any means is this interest evincing itself by large orders, but rather by numerous inquiries designed to determine what this country has to offer in the way of aircraft and allied products. Although the majority of these inquiries are from overseas concerns actually in the market for aeronautical products, a great number of them represent only possible future sales. Often inquiries which emanate from several different places originate from a single source and represent only one possible sale. In keeping with the policy practiced by overseas importing houses, the same inquiry is received by a majority of the manufacturers in this country. As a result, the impression has been created that abroad a fertile market awaits the American manufacturer of aeronautical products.

It was to determine the possibilities of the overseas markets and to devise a plan by which American-made products might be successfully merchandized in foreign countries that the export department of the Nicholas-Beazley Airplane Company was organized. The company began a survey of the overseas market. The results of this survey seemed to indicate that at present the actual demand in any one territory abroad does not justify a single concern's establishing a complete sales organization.

The Nicholas-Beazley Export Group, consisting of manufacturers in this country of several leading lines of aeronautical products, was organized to meet the aggregate foreign demand for American aircraft and aircraft supplies. The complete line of aeronautical parts and supplies carried by the Nicholas-Beazley company and such products as Scully helmets, Whizzit flying suits, Warner Scarab engines, Kendall oil, Swallow aircraft and others were included in the group. A plan was drawn up by which representatives are now being established abroad to place the foreign consumer in a position to secure any product he might need from local concerns familiar with his business methods.

Since its establishment nine months ago, the export department of this company has made from thirty-five to forty shipments monthly to all parts of the world. Interest in aviation in foreign countries is increasing, but it has not yet reached any considerable stage of development.

There is one problem that confronts virtually every manufacturer of aircraft in this country today. What of the possibility of the foreign market? A few years ago this wasn't the case. Interest was at a peak and manufacturers were few. Since that time, to be sure, interest has continued to grow, but production has increased tenfold. The output for 1929, which at the beginning of the year was estimated at 10,000 planes, has of necessity diminished to little more than half that number. The outlet for the surplus, the most logical outlet and one many American manufacturers are prone to consider a natural heritage, is the foreign consumer.

But how about this market? What are its present and future possibilities? It really is not difficult for even those who have not been out of their home state to visualize the future possibilities of aviation in markets abroad. In the United States, with its network of highways and rail lines, a trip of 3,000 miles across the continent by motor car or train is not difficult, whereas to attempt the trip from Canton to Shanghai or across the republic of Brazil would not only be impracticable but impossible.

The Sahara Desert has been crossed by specially-built automobiles. But in the territory of Oceania, which in reality is not as extensive as the name may imply, the only means of communication are slow packet boats. The trip up the Yangtze from Shanghai to Hankow, before impossible by any means other than river boats, took from three to four weeks. Even now an element of uncertainty is presented by the ever-present river pirates. Today, with mail and transport airlines already in operation, the journey is made in from three to four days.

It is easy to appreciate how much aviation will mean to the many islands in Oceania, where an airline to the larger islands of the group is already in the process of formation. The smaller islands will be joined by short routes with packet steamers; and no longer will the arrival of the monthly or bi-monthly boat, bringing news from home in serially numbered letters to be read and re-read, be a gala event. The weekly or bi-weekly mail delivery will become much of a routine matter.

Consider what effects aviation will have on the life of the hacienda owner of South America in enabling him to make the journey between his home and the principal cities in a few hours. To him today the trip is an event of equal importance to the arrival of the packet boat in Oceania, a monthly or bi-monthly affair. Under favorable conditions, it usually requires days of hard travel over rough roads; during the rainy season the trip is frequently impossible.

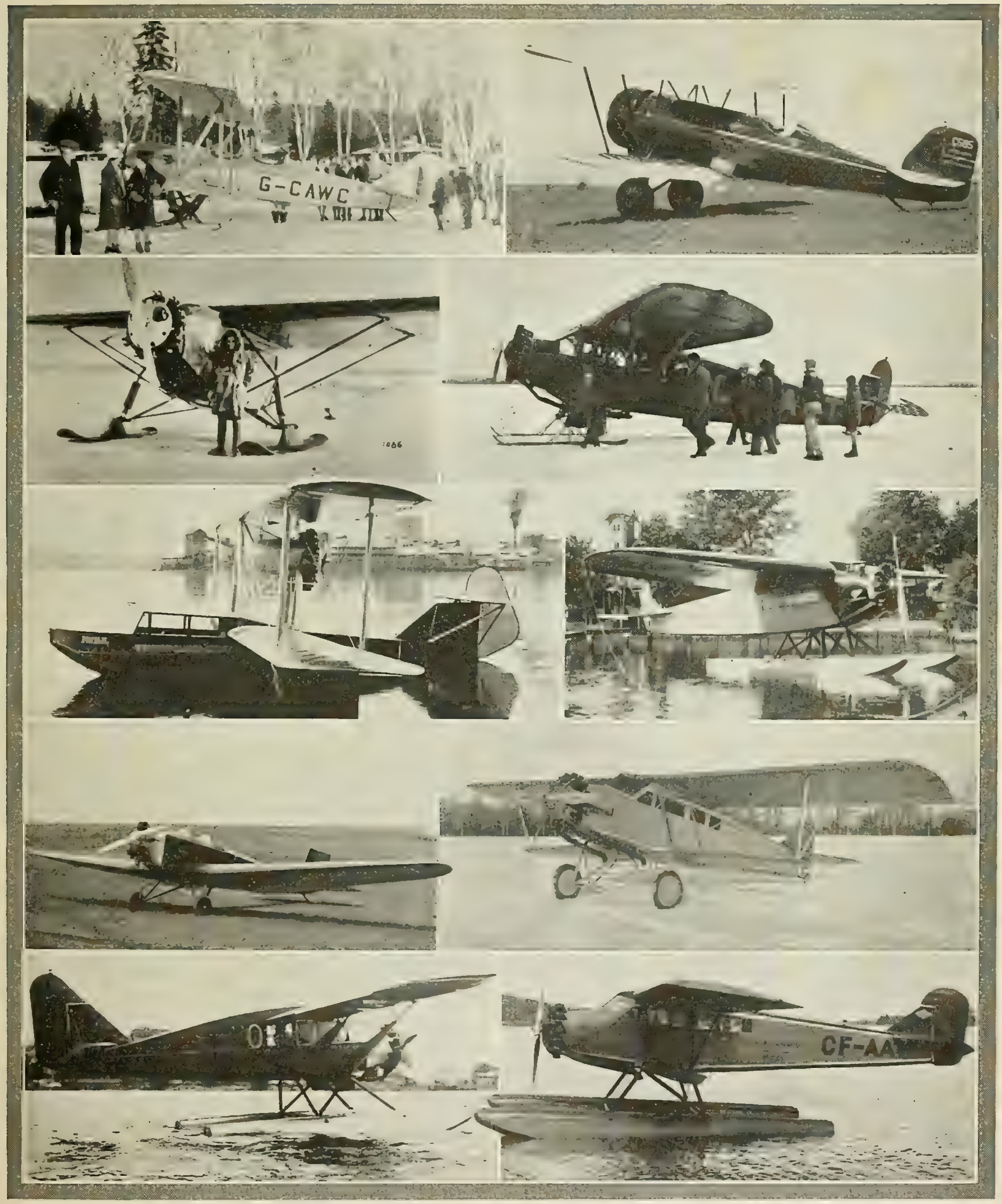
Take for instance an actual case of the time saved by air travel. The representative of the Nicholas-Beazley company in Guatemala City, Guatemala, owns large coffee plantations in the coastal regions of the country. The distance from his headquarters in the city to the plantations is several hundred miles. Previously, to visit the plantations was to make a tiresome journey of several days by motor car and horseback. With two planes which he recently purchased, he is now able to make the journey in several hours and return the same day if he so desires.

There are many countries—for instance China—which will omit the automobile stage. There are many territories where the only connecting link with the outside world will be by air. There are many regions in which roads are beginning to be developed and in which the automobile will combine with the airplane in opening vast natural resources.

Aviation in the more sparsely settled parts of the world will do what the automobile has done for this country in blending a more uniform racial type of people, in opening natural resources, in paving new and quicker avenues for the marketing of merchandise.

The Far East, Oceania,

(*Continued on page* 240)



AMERICAN COMMERCIAL AIRPLANES IN CANADIAN SERVICE

Left column, reading down: Eaglerock biplane on skis, used by British Columbia Airways, Ltd., Eaglerock distributors; Western Canada Airways Whirlwind-powered Fokker fitted with skis for operation from the snow-covered fields in northwest Canada; Boeing B-1E flying boat used by Western Canada Airways and now being produced at Vancouver; Aeromarine-Klemm low-wing monoplane powered with a LeBlond engine; Bellanca CH powered with a Wright Whirlwind 300-horsepower engine and equipped as a seaplane, being operated by Commercial Airways, Ltd., on a Canadian contract air mail route.

Right column, reading down: Pitcairn Super-Mailwing of the type used by the Canadian Department of National Defense and on Canadian air mail lines; Fairchild 71 cabin monoplane on skis being operated by Transcontinental Airways, Ltd., for air mail and passenger flying; Fokker single-engined monoplane on floats used by Western Canada Airways; Standard six-place Buhl Airsedan of the National Air Transport, Ltd., of Ontario; Buhl Airsedan fitted with floats and operated by the Cherry Red Airline, Ltd., of Saskatchewan. This plane has been in constant service since last March.

PRODUCTION AND EXPORT

By Ernest W. Fair

THE IMMENSE possibilities in foreign markets comprise a salient point in the manufacture and production of American aircraft and aircraft products that has heretofore received very little attention but has now come to the front and is demanding serious consideration.

Although this opportunity is not so great on the European continent, it is worthy of thorough development in South and North American countries, as well as in Asia and Africa. American aeronautical standards have climbed to a sufficiently high level to create a demand for American aircraft, not only in those countries in close proximity to our own borders, but in those at some distance as well.

The fact that next year's production schedules call for the manufacture of a greater number of planes than the domestic market may be able to consume, will necessitate seeking markets elsewhere if entire production plans are to be carried through. There will still be many units that will have to be disposed of in some other market. That market is, of course, the export field, and it is towards this that aeronautical manufacturers are looking with anxious eyes and making wild guesses and calculations as to ways and means of procedure.

Let us consider the export percentages. During 1927, according to Department of Commerce statistics, three per cent of total production was exported. In 1928, four per cent was exported and figures compiled so far this year bid fair to give 1929 a figure of ten per cent, an enormous increase, which we shall consider later. Before 1927 there was no serious effort to reach the export market, and even until 1929 little attention had been devoted to the potentialities of foreign sales.

Figures on engine exports, perhaps an even wider market than aircraft, show that during 1926 there were 297 engines exported at an average price of $3,000 per unit. During 1927 this figure reached an average of $6,000 per unit, whereas for the first eight months of 1929 it had declined to $4,000. The latter average probably is largely the result of decreased production costs and increases in production units, which was only natural.

But where can we export? Let us consider that. Let us look at some recently announced Department of Commerce figures for the first six months of 1929, which show exports of sixty-two planes to Mexico, forty-four to Canada and thirty-two to Chile. An investigation will show that during the six years from 1922 to 1928 Canada and South America received well over half of the distribution. What does this show? The export market for the coming year.

One or two manufacturers have already seen the possibilities of these two markets and have established plants in Canada, with plans for them in South America. These two territories, as well as Central America, offer the big market. They are within fly-a-way and economical transportation distance and their peoples are more familiar with American products and American methods.

A manufacturer can enter these markets with less expense for the marketing of each individual unit, and in the case of bordering countries, can enter them as cheaply as any individually owned plant there might do. Recent sales to Mexico have proved this.

Let us consider the possibilities in these countries. For the first thing, a vast market lies there that has as yet been relatively untouched or unfound. It is only arising now with the awakening in those countries to the value of aviation and with the inauguration of international commercial airlines. Within the next year or two there will undoubtedly be established several additional airlines of considerable extent on the South American continent, and these will help create a market for transport planes and equipment. The manufacturer who keeps a careful eye on business conditions in those countries will doubtless afford a concrete example of the extent of this market.

The greatest possible market for export trade, however, lies in the sale of smaller airplanes, particularly the light two-place plane which combines economical and dependable operation with maximum safety. Utility for business organizations and the ability to use the fields and meet conditions existing in Central and South America will also be factors in determining the type of planes used.

The scarcity of landing fields in the Latin-American countries has done much to retard interest in aeronautical development there. Although landing fields in Mexico and Central America are becoming more numerous, as are those in South America, development has only begun. The light airplane is perhaps the most suitable for this market at the present. The ability of such a ship to climb out of and land in small and somewhat hazardous fields will do much to promote its sale. Strangely enough, the manufacturers of larger planes have thus far entered the export market with the most serious sales efforts. The light airplane producers will do well not to neglect it.

The lack of landing fields has in the past strongly influenced the sale of seaplanes in these places, with the result that a great number have been marketed; in fact, a majority of export sales to these markets have been seaplanes. The quiet waters in these regions offer good landing places. Yet seaplanes are not practical for continental work, and it is over-land flying that is going to provide the greatest market.

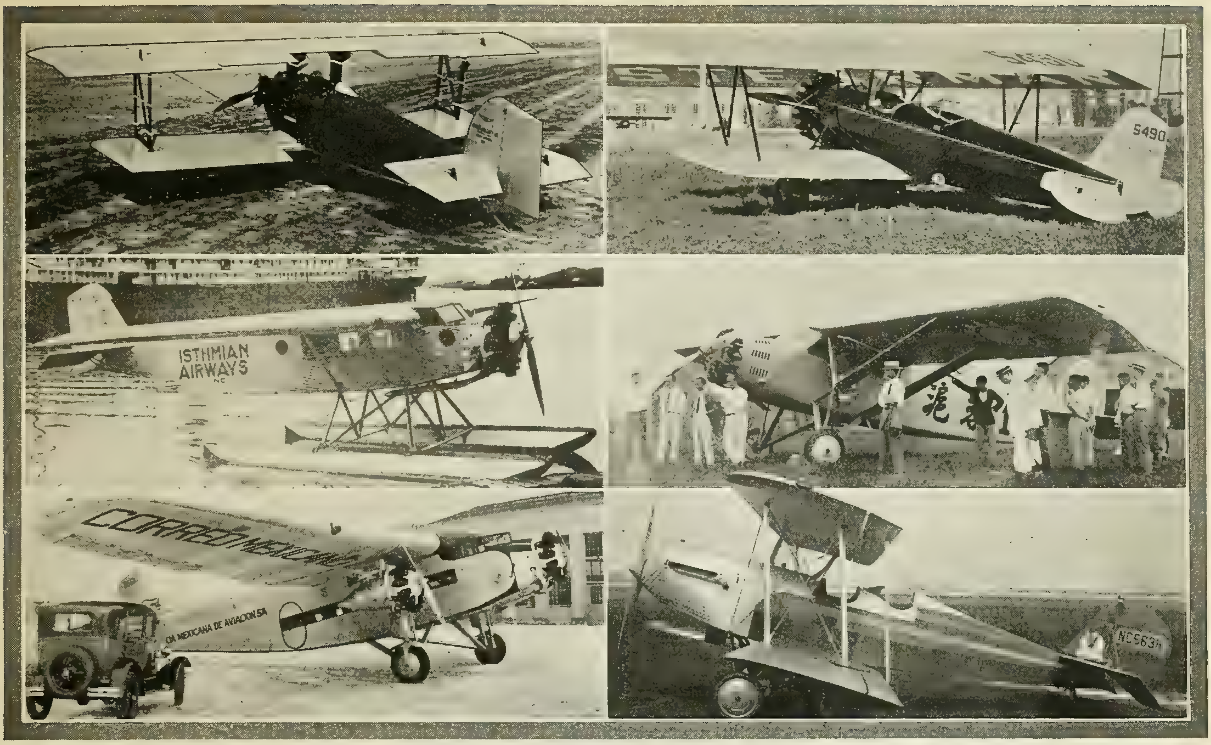
Oil companies, development organizations, mining enterprises, etc., all can make extensive use of aircraft in their activities in foreign territory, but no real effort has been made to sell them planes because of the difficulties contingent upon operations in such locations.

Chile, the Argentine and Brazil are among the South American countries that will offer good markets, not only because of the available wealth for the purchase of aircraft, but also because of the adaptability of planes to use within the confines of these lands.

A systematic and economical plan of export merchandising has been difficult to conceive, and considerable delay has resulted from the lack of knowledge of how to proceed. Obviously, the sale of aircraft in foreign markets will necessitate a good deal of sales promotion and will involve some competition. Some work has already been done, and this we shall discuss; but for the present a brief exposition of the present system of export sales and future requirements of the market abroad is of interest.

Marketing one-tenth of one's production must demand close to one-tenth of one's promotion allotment, but unless this sum is very systematically applied it will prove insufficient. The mere establishment of dealers in foreign countries will help, but will not be enough.

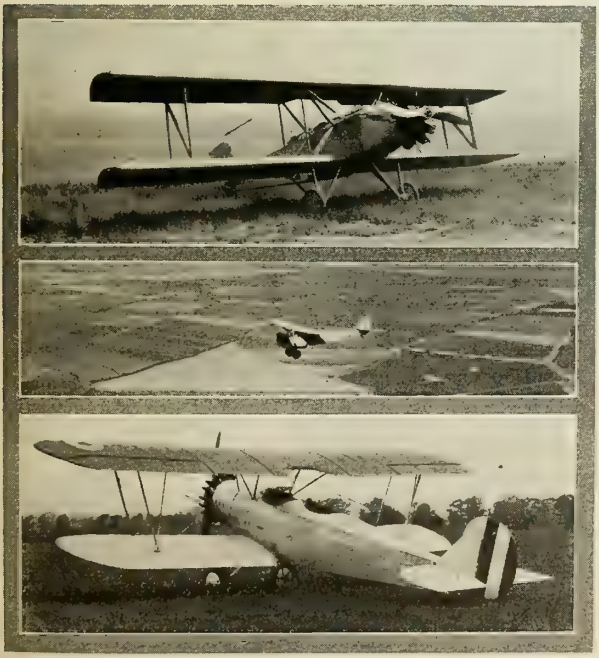
It has frequently been the policy in the past to let things take care of themselves. When a man in Buenos Aires purchased a plane, for instance, (*Continued on page* 216)



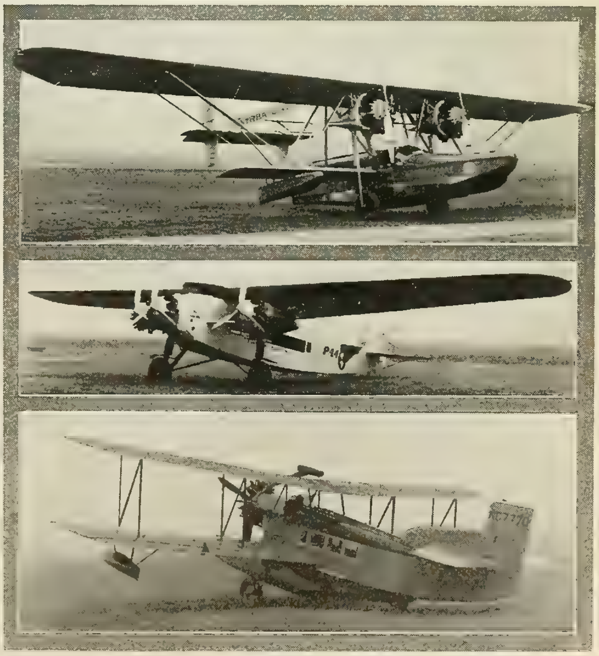
TYPICAL AMERICAN COMMERCIAL AIRPLANES USED IN FOREIGN LANDS

Left column: Irwin Meteorplane fitted with an Irwin engine, exported to Iceland for mail and passenger flying; Hamilton Metalplane on floats being flown by the Isthmian Airways in the Panama Canal Zone; Ford trimotor all-metal monoplane being operated in passenger and mail comercial service in Mexico by Cia Mexicano de Aviacion, S. A.

Right column: Stearman C-3B biplane like that being used by the Alaskan Airways with headquarters at Fairbanks, Alaska; Stinson-Detroiter in service on a Chinese Nationalist air mail line which extends from Shanghai to Nanking; OX-5-powered American Eagle biplane of the same type now used for commercial operations in Australia and Canada.

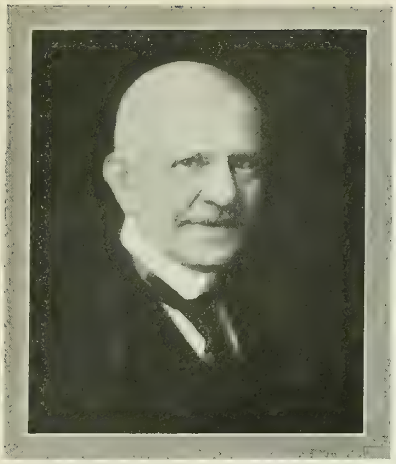


Boeing training (top) Fairchild and Keystone planes in Peru.



Pan American Airways' Sikorsky (top) Fokker and Loening.

GUGGENHEIM FUND'S ACTIVITIES CONCLUDE



Daniel Guggenheim

AS AN example of generosity, constructive patriotism and timely aid to a struggling industry, the action of Daniel Guggenheim in creating the Daniel Gugenheim Fund for the Promotion of Aeronautics stands unique in the history of the United States. Rarely has such a sum been offered to the American people to supply a purely industrial need.

The history of the Fund's organization and accomplishment shows that Harry Guggenheim provided the incentive which led the elder Guggenheim to place this Fund in existence, and it was he who, as president of the Fund, administered it for nearly four years with a gratifying record of accomplishment. The Fund, during that period, enlisted the aid of the best minds in Europe and America, called forth the highest expressions of engineering skill on both sides of the Atlantic, and won the active support of five governments.

Jimmy Doolittle and Harry Guggenheim

The thousands of persons who have become connected with the aviation industry in the last two years may not remember the industry's struggle for existence in the first years after the war. In those hectic days nobody knew much about the future of commercial aviation—they had their hands full taking care of the present. By the middle of 1925 the industry had become quite inefficient and was largely dependent on government orders to keep its factories running. The civilian market for airplanes was not a good financial risk. Banks scorned the frantic appeals for industrial loans. Government planes and government pilots carried the mail on a government-operated airway, and the commercial airplane operator was a man who charged five dollars a head for five-minute rides in a Jenny.

But in Europe, with heavy government subsidies, passenger airliners were operating on regular daily schedules and carrying capacity loads on the more popular lines. The European situation was well known in America, but there seemed to be no way of improving the domestic aeronautical situation without direct assistance from the Government, which was, and is, contrary to policy. In this country there was no private agency willing to assist the aviation industry with actual cash, hard work and the proper equipment.

At this time Harry Guggenheim was a moderately-interested executive in a copper company. He had been a pilot during the war and had seen service in Europe, but had returned afterward to an industrial life. His father, Daniel Guggenheim, had built up an enormous organization of copper companies throughout the western hemisphere. After considerable experience in South America and Cuba on various Guggenheim properties, Harry had returned to New York as head of an important department.

To him, flying was becoming more than a matter for newspaper discussion. He was familiar with European developments and very much interested in contributing to the advancement of American commercial aeronautics in whatever manner he could. He had a nebulous idea of gaining coöperation from certain wealthy men and forming a committee to study the whole commercial aviation situation and recommend a course of action which would provide a little stimulation.

Daniel Guggenheim became interested in the idea. He told Harry that he would back the venture entirely himself and would appoint Harry to administer it. Daniel Guggenheim was not a beginner in aviation matters; for, the year before, he had established the Guggenheim School of Aeronautics at New York University and endowed it with several hundred thousand dollars.

Having determined to aid in the venture, Daniel Guggenheim prepared an exhaustive survey of aviation conditions as they existed then—January 1, 1926. He came to definite conclusions about the true value of a private agency assisting in the development of commercial aviation, based on facts from his survey. He thereupon wrote a letter to Herbert Hoover, at that time Secretary of Commerce, in which he outlined what he proposed to do with his Fund, and stated that he would coöperate with the Department of Commerce in every way. He wrote:

"I am venturing to advise you . . . by this letter of my purpose to establish a Fund which will coöperate with you and with all agencies of the Government and the public generally in advancing the art and science of aeronautics and aviation."

Then follow several pages of quotations from the survey, concerning the recommendation of President Coolidge's Aircraft Board (1925) and a very complete resumé of the whole aircraft situation; statis-

(*Cont. on p.* 258)

Captain E. S. Land, U.S.N.

AERO DIGEST

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EARNED !

THERE is something about air-mindedness that makes men wide-minded, also. Perhaps it is the breadth of fliers' horizons. We find it especially satisfying that the Hon. Frank James, of Michigan, should have succeeded the late Julius Kahn, of California, in his vitally important committee chairmanship, and that his should have been the voice to propose posthumous presentation of the Distinguished Service Medal to that splendid son of the Pacific Coast who did so much for American defense. When Frank James entered Congress a big man entered; when Julius Kahn departed a big man went to his reward—which should be great. It is gratifying to the nation that, in so far as that is possible, a big man steps into his Congressional place. Noteworthy, also, is the other fact that the same session which has seen the introduction of the bill for honoring the memory of Julius Kahn will see the introduction of another by his wife (to whom it is sufficient tribute to say that she was chosen to succeed him in the House of Representatives) providing for immediate and elaborate improvement of Crissey Field. It is a fine thing for the air industry that Julius Kahn should have left to follow him in Congress a widow of astonishing ability, trained to complete sympathy with those ideals of national defense for which he strove so earnestly, and that Congress should possess a member so fit as W. Frank James to serve as his successor in the Military Affairs chairmanship.

AERONAUTICAL EXPORTS

ALTHOUGH more miles are flown annually in North America and Europe than in all the rest of the world, it is significant that aviation is appearing and developing in nearly every land, no matter how remote or unimportant as a world power. The introduction of aeronautics in out of the way places has been slow, and so too will be the progress in the design and production of flying equipment. Peoples whom we are accustomed to regard as too far removed to devote much thought to, are inevitably turning to us for precedent. And thus is opening a tremendous export market for American aircraft. Indeed, so great is the growing importance of foreign trade that the government established, under Leighton W. Rogers, the Aeronautics Trade Division of the Bureau of Foreign and Domestic Commerce to promote aircraft exports.

Despite the fact that European contact with the less powerful nations has been closer than ours, with present conditions prevailing, it is more logical that the American aeronautical industry supply their demands; for nowhere else have large-scale production methods been perfected as in this country. In the United States, planes can be manufactured at less cost, in greater numbers, and in more useful varieties; in Europe, hand production methods run up costs (cheap labor to the contrary notwithstanding), limit quantity, and restrict variety.

If the aircraft manufacturer is to take full advantage of this expanding export market, he must know what conditions exist throughout the world. With the hope that it may contribute to this knowledge of foreign aeronautics and of export channels, AERO DIGEST offers its first Annual Export Number; and in doing so the publishers wish to express appreciation to the Aeronautics Trade Division for its coöperation in the preparation of this issue.

RESPONSIBILITY FOR AIR ACCIDENTS

CLARENCE YOUNG, Assistant Secretary of Commerce for Aeronautics, very plainly told the New York Board of Trade that it is not his Department's function to place the responsibility for air accidents. He gave excellent reasons for this and we are heartily in accord with him. If the Department fixed the responsibility it would be made the scapegoat of shyster lawyers and would be the cause of instituting innumerable suits at law.

All the Department can do to prevent other accidents is to investigate and report upon those which do occur. Bills offered to Congress demanding that the Department go further by fixing the blame for each fatal crash would, if passed, put unworthy legislation on the statute books—laws which would hamper the nation's progress and the air industry.

Secretary Young should not be harassed in the matter. His experience is sufficient to enable him to solve the problems pertaining to his office. The industry has complete confidence in him; and if the meddlesome crowd that infests Washington will keep away from him, the accident problem will be worked out satisfactorily.

MOFFETT AT THE ARMS CONFERENCE

THE wisdom shown by Secretary of the Navy Adams in the reappointment of Admiral Moffett as Chief of the Bureau of Aeronautics is now indicated by the designation of Admiral Moffett as advisor to the American Arms Conference Delegation.

Military defense by means of aircraft undoubtedly will be the subject of a major part of the discussion and with Admiral Moffett constantly on call the American delegates will have at hand advice upon this subject which will be second in value to none available to any delegates from other countries.

Admiral Moffett is entirely informed with regard to heavier-than-air and lighter-than-air ships, methods, tactics and possibilities. He will not be caught napping, nor will he fail in that accuracy of technical imagination which is so important to constructive work on such occasions.

Secretary Adams' solid common sense will pay a handsome dividend to the United States. He has shown real foresight in selecting Admiral Moffett.

BAD TIMES? MAYBE.

PESSIMISTS murmur that times are bad and that aviation, therefore, cannot be expected to progress as rapidly as we had hoped it would during the next twelve months. A survey of landing fields and building operations planned does not indicate that a general feeling of depression lurks throughout the country. On the contrary, these projects indicate that at least among air-minded people the reports of the pessimists serve generally as high-proof fuel for their mental motors.

During 1930 over 2,500 airports costing 750 million dollars will be opened throughout the nation, and daily, since these figures were inscribed in our notebook, new ones have come in which would inflate that very handsome total. Every mail brings evidence of the coming of more airports; almost every out-of-town newspaper carries headlines telling of appropriations by its local financial bodies for the construction of more landing fields. Washington is at least three months behind in listing this particular sort of enterprise.

Airports mean much to every line of business, their beneficent influence being by no means confined to aviation and aeronautical manufacturing activity. To a degree not understood at all by average men, airport development means continuing prosperity for everyone, for business depends upon communications, and airports mean increased rapidity of mail, goods and passenger transport.

RESERVE OFFICER'S PROGRAM

THAT it is most desirable for men who have had military training, though not now actively members of any operative organization, to be definitely included in the organized national defense scheme is obvious. The national executive committee of the Reserve Officers' Association of the United States has devised a plan which will be presented in the House by Congressman W. Frank James of Michigan and in the Senate by Senator David A. Reed of Pennsylvania.

This plan contemplates the establishment in the War Department of a separate division under which all activities of Reserve officers shall be coördinated. The idea, which is heartily approved by Col. Walter C. Cole, national president of the Association, provides that Reserves officers shall be consulted before the issuance of War Department orders which affect them and that 25,000 Reserve officers (an increase of 6,000) shall be trained in 1931. It also provides that Reserve officers on active duty shall be allowed eight cents per mile for traveling, as are Regular Army and National Guard officers.

Inasmuch as this legislation will definitely affect the air officers of the Reserve, and if enacted, will be greatly to the advantage of the national Reserve air activities, every really air-minded citizen should do whatever may be possible to assure its passage.

BYRD

IT has been our pleasant duty so often to express appreciation of "Dick" Byrd and his fellow explorers now in the Antarctic, that new demands for commendation on behalf of his latest achievements find us almost at a loss for words with which to express adequate praise for his accomplishments.

Byrd never fails. He never even falters. The mystery of the icy fastnesses which cling upon the Southern segment of this sphere of ours, spread out beneath this daring air explorer as a map spreads out before you while you sit comfortably at your desk.

Only through the indomitable efforts of men like Richard Byrd can Nature be compelled to yield the secrets of regions which have so tempted, discouraged and defied brave and enterprising men for many generations.

This Antarctic enterprise of Byrd is perhaps more dramatic scientifically than any other in which man has striven. The realization that through the Wrights' genius the explorer finds it possible to fly back and forth across the recently inaccessible South Pole, is not more bewildering than the thought that through the genius of Marconi he finds it possible actually to converse by radio daily, hourly, momently with the office of the publisher of his stories, the New York *Times*.

THE NEW YEAR

NO USE wishing Happy New Year to the aviation industry unless the aviation industry realizes that it is an entity, not a group of individuals, and works for its own success. Later on, after the big struggle has been won for air transport, air defense and air-mindedness in general, individuals may sit back in the midst of progress and prosperity (if they like, which they won't) playing lone hands for amusement.

Closer coöperation during 1930 must be the chorus of our New Year song. We didn't hear it as a Christmas carol. We hope it hummed a bit in some hearts upon New Year's Eve. And we'd better all tune in and sing it in close harmony for the balance of the twelvemonth. We get nowhere by spending all our time in fighting one another. What is one's problem is the problem of the industry.

A good resolution for every man in the industry would be to clasp hands forthwith with the other fellow, who may be having a hard time of his own, and help him pull the rope which will haul out of the dim void success for everybody. Obstacles that to individuals seem like mountains would shrink to mole-hill size if the whole gang was on the job, striving in every worthy way.

THE AIRCRAFT CARRIERS

ACCORDING to the terms of the Washington Treaty of 1921, the United States Navy has its complement of battleships; it has not its complement of aircraft carriers. It was allowed 135,000 tons of aircraft carriers; it has in the *Lexington* and *Saratoga* 66,000 tons, which are considered effective (but are not), and the *Langley*, which is experimental. The *Lexington* and *Saratoga*, the Navy itself admits, must be scrapped as soon as they can be replaced by really effective units. They are costly experiments.

If the leading statesmen and naval experts agreed in 1921 that the United States Navy required 135,000 tons of carriers in order that the balance of power agreed upon should be maintained, it is no less than criminal folly or blind stupidity on the part of Congress to fail to vote the necessary money to construct that tonnage. The American Navy, as constituted today, is obsolescent. If 135,000 tons of carriers was considered necessary in 1921, is it less necessary today, when the weapon the carrier is to use, the airplane, has advanced so rapidly in efficiency, in range?

In his Armistice Day address President Hoover said: "Aircraft and other instruments of destruction are far more potent than they were even in the great war. There are fears, distrusts, and smoldering injuries among nations which are the tinder of war. Nor does a single quarter of a century during all the ages of human experience warrant the assumption that war will not occur again."

War will occur again. What human nature was yesterday it is today and will be tomorrow. Today fair words may be exchanged between friends; tomorrow blows may be exchanged by enemies. History repeats itself, fundamentally unchanged, because man, who makes history, himself is unchanged. The pilot of the bombing plane is the descendant of the savage with the stone axe; as his ancestor with an axe outranged the enemy with a stone, so he with his airplane outranges the man with a gun. He has discovered, if the man with a gun has not, that the fundamentals of warfare are ever the same.

INSPECTION OF AIRCRAFT METALS

By George Svehla

IN speaking of the opportunities which aviation presents to the ambitious young man of today, and perhaps the young woman also, the statement is often made that there are ten men employed on the ground for the one man at the controls. Which is neither an exaggeration of the facts nor a minimizing of the value of the work done on the ground. The ground men on whom the safety of the pilots' and passengers' lives depend may be at the airport from which the plane has just taken off, and others may be in offices a hundred or thousand miles away.

Everyone recognizes the importance of inspecting a plane and its engine before flight, hence the many mechanics. Safety is also dependent on design. To that end the Department of Commerce investigates the various types of planes being produced, and requires the licensing of the approved types. The Army and Navy Departments, also recognizing the importance of design, do much experimenting before they adopt any type of plane for the use of entire aerial squadrons.

Inspecting engine parts at plant of the Wright Aeronautical Corp.

Both the Army and Navy Departments, as well as commercial manufacturers, recognize that there must be no flaws in any of the material which goes into the fabrication of planes, engines and propellers. In those instances in which the Army and Navy manufacture parts at arsenals and navy yards, even the melting of metals such as aluminums, brass, and bronze, which they buy in ingot form, is closely supervised.

Material inspectors for both the Army and Navy are selected by the U. S. Civil Service Commission through the usual competitive examinations, and ex-service men are given the usual credit for former Government service. On passing the examinations, eligible candidates are listed, and selections are made from these lists as the need for more men arises. The minimum salary of any assistant inspector is $6.40 per day, plus expenses. Commercial manufacturers pay as much, or more, and enlist many of their employees and executives from among those who had their start with the Government service.

In view of the rapid expansion of the industry and the number of parts to be inspected before a plane is finally in complete assembly, young men who are neither fliers nor mechanics by inclination or natural aptitude, but who wish to find for themselves a niche in the aeronautic industry, might well consider seriously the opportunities presented in the inspection field.

The various phases of inspection work can be grouped and classified, and what applies to one position in any one group applies generally to others in that same group.

The two important and main classifications are those of Government Inspection, and Commercial Inspection. In the Government group are the Navy Department and the War Department, including the Air Corps, Signal Corps, Engineering Corps, etc. Inspection by the branches of the Government departments is almost always supplementary to the work of inspectors employed by firms filling Government contracts for planes or parts. The Commercial Inspection group, on the other hand, does work which is not supplementary but progressive, beginning with the arrival of materials at the manufacturer's plant and concluding with their shipment farther down the line. In certain instances, where there is a large shipment to be made or the parts demand extraordinary precision, a commercial manufacturer will arrange with the jobbing manufacturer to have his own employee go to the plant of the jobber to make supplementary inspections of parts. All this is done in addition to the certificates and affidavits which the jobbing manufacturers furnish the assembly plants, testifying to the mechanical properties and chemical analyses of the matarials from which the parts were fabricated.

Material inspectors, mainly in the Government group, may be classified further as Resident or Visiting inspectors. In places where the Army or Navy Departments maintain offices, the inspectors usually provide the manufacturing plants with a Visiting service. Where the quantity of work is large enough to require the attention of an inspector regularly, a Resident inspector is appointed to the plant. In places where there are no "offices," the manufacturer provides the Resident inspector with desk space, and the Resident inspector or one of his assistants provides other plants in the vicinity with inspection service on receiving written notice that there are materials awaiting his disposal.

Commercial manufacturers rarely have an inspector in residence at another plant, but send one out when the contract calls for such supervision. In some cases, the district office or representative attends to such inspection.

The materials which go into the fabrication of airplanes may roughly be divided as being metallic or non-metallic. With aircraft construction tending more toward "all-metal" types, the demand for the non-metallic materials on the outside surface is not keeping pace with metallic materials. Wood products, composites such as plywood and rubber products, and fabrics, however, are the non-metallic products of greatest importance. With the exception of wooden propellers (the War and Navy Departments are now contracting for metal propellers almost exclusively), the non-metallic products receive Government inspection at time of assembly. The commercial manufacturers usually accept the materials on certificates of purity and strength.

Neither the Government departments nor commercial manufacturers are concerned with how the metal for steel tubes, steel parts, aluminum, bronze, and brass alloys, fixtures, and parts, is melted down. The Army or Navy inspector is, however, sometimes called upon to stamp ingots of metal with the Government insignia when a navy yard or arsenal buys

(Continued on page 246)

FINANCING AIRPLANE SALES

By William W. Luftig

THERE are several steps in the financing of the airplane industry. The manufacturer borrows from the bank on an open line of credit for the purchase of raw materials, the payment of wages and other production expenses. When the finished product is shipped to the distributor or dealer, the manufacturer draws a sight-draft on the dealer or distributor and discounts it with bills of lading attached at the manufacturer's bank. This bank notifies its correspondent bank in the dealer's city that it possesses such a draft and forwards to it the bills of lading. The correspondent bank then informs the dealer that he can secure the bills of lading by payment of the draft. In order to meet the sight-draft, the dealer borrows from his bank with the airplanes as collateral, or arranges with a finance corporation to make payment to the bank. Finance companies are taking over most of the financing, leaving to the banks the rediscounting of this paper with the endorsement of the finance company.

The distributor must keep a fairly large inventory on hand to take care of dealers' requirements; and the dealer must accumulate an inventory, much smaller of course, to take care of consumer demand. The limited capital of these distributive agencies compels them to seek credit from finance companies to carry them while they dispose of their planes. Aircraft manufacturers have followed the lead of the automobile industry and demand cash for their products. The finance company justifies its existence through its financing of dealers' and consumers' purchases.

Aside from the problem of dealers' credit and physical collateral behind the security, the major problem confronting the finance company is to select some type of security that will give it the greatest protection in the financing of dealers' purchases. There are five possible forms of security for this type of financing; the trust receipt, the warehouse receipt, the conditional sales contract, the chattel mortgage and the lease agreement. Each of these methods are in use in the automobile industry and are being used, or considered, in connection with airplane financing. The particular type of security used depends to a large extent upon the laws of the state where the business is transacted. Each of the above types requires special procedure and involves different degrees of security. Dealers are primarily interested in the type of security required by finance companies because of their obligations under the security agreements and because of the legal interpretation given by the courts affecting such dealer-finance company relationships. Manufacturers are also interested because if they are required to repurchase, or to endorse the paper of their dealers in order to have finance companies accept such dealers' commitments, their interests are jeopardized if there is conversion by the dealer, or if the dealer violates his agreement with the finance company, or if the dealer has financial troubles and the rights of judgment creditors or creditors in bankruptcy are concerned. Bankers are incidentally involved with the type of security used through their discounting functions.

As most distributors and dealers are unable to finance shipments from their own capital, the usual practice of a dealer is to establish relations with a finance company and to notify it of the value of a shipment. The finance company then draws a check payable to the bank holding the sight-draft with the bills of lading attached for sixty to eighty per cent of the face value of the draft, the dealer supplying any balance required.

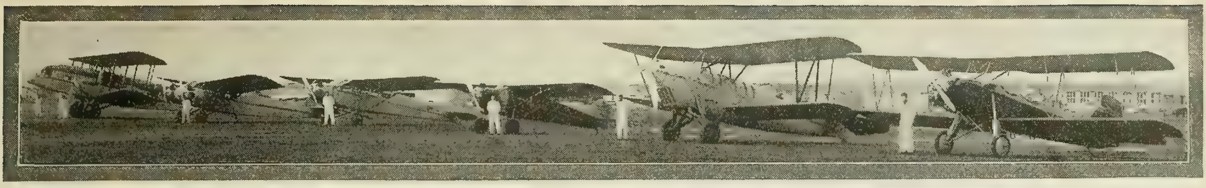
At this point, the finance company, through the bills of lading delivered to it by the bank, has both possession and title to the airplanes. It is, however, necessary that the dealer obtain the airplanes so that he can sell them. One method for the dealer to obtain possession is to execute a trust receipt in which the dealer promises to hold the airplanes in trust for the finance company. The dealer thus obtains possession and the finance company has a trust receipt as security for the loan advanced to the dealer so that he can sell the planes. He receives permission from the finance company to sell, provided the identical proceeds from such sales, to the amount of the trust receipt, are turned over immediately to the finance company after the sale is consummated. The finance company takes title after advancing money on the airplanes and retains title in itself until the dealer delivers the purchase price to the company.

This type of security is generally not used, because it does not afford sufficient protection to the finance company either in the courts or at the hands of the dealers. The courts in some states hold in effect that the trust receipt is but a secret lien of the finance company and does not hold against bona-fide purchasers of the airplanes, against trustees in bankruptcy or against attaching creditors. The fact that the dealer has the permission of the finance company to sell, prevents the company from claiming the plane from the purchase even though the dealer does not turn over the proceeds of the sale. As far as the purchaser is able to ascertain, the plane is the property of the dealer and the purchaser is held to be the owner through purchase, even though title is still with the finance company. The only recourse of the finance company is to search for the identical proceeds pertaining to the particular plane sold and claim the funds even if pledged to another creditor. When the proceeds are unable to be located or identified, the finance company becomes only a general creditor of the dealer. Furthermore, this floor plan method of financing can bring on various abuses on the part of the dealer. He can make personal use of the plane and often withhold payments on the planes, after selling them, for an unreasonable time. If the finance company attempts to check the planes often, it may antagonize the dealer and in general this type of financing is not considered good protection, even though dealers may be bonded against conversion of the planes owned by the finance company.

It is said that in order to obtain the full benefits of a trust receipt, it should be used only when the title to the property is given to the holder of the trust receipt by a third party, not by the trustee. Otherwise, it possesses no more securiy than an unrecorded chattel mortgage or private agreement.

Another method of financing the dealer or distributor that is available to the finance company is by means of the warehouse receipt. The planes are either placed in a bonded warehouse or on the premises of the dealer. If the planes are stored on the dealer's premises, it is known as "field storage" warehousing. The purpose of having the planes on the premises is to permit easy access for sales purposes. An entire floor or part of the floor is segregated as a storage warehouse and is fenced off or padlocked. A warehouse company is formed which issues receipts to the finance company, or the segregated section is leased directly to the finance company. Precautions are taken to prevent

(*Continued on page* 224)

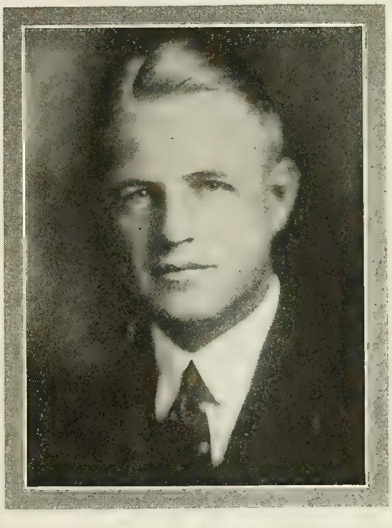


Complete line of Curtiss Commercial airplanes which, in addition to the military models, are sold abroad through the Curtiss Aeroplane Exports Corp.

WHAT AMERICAN AVIATION OFFERS THE FOREIGN BUYER

By John S. Allard

Vice-President and General Manager,
Curtiss Aeroplane Export Corporation



John S. Allard

AMERICAN aviation, with determination and persistence, is building day by day toward an impregnable position of leadership in the world market for airplanes, airplane engines, accessories and equipment in every branch of air transportation. Fortunately for those engaged in this new industry, circumstances have been such in the past that progress in the development of the export market for American aircraft manufacturers could go forward upon a sound basis. A place has existed for ideals, as well as ambition, without the necessity for temporary success at the expense of permanent good-will.

In the first place, the close of hostilities in the World War found the manufacturers in this country with somewhat smaller stocks of surplus war material on their hands than was the case with a majority of the combatant nations. This relieved the American industry of the pressing need to dispose of, at any cost in any market, obsolescent and useless equipment.

Furthermore, the industry was not subsidized by the United States Government. There was no need to force stocks upon nations unorganized to design and manufacture airplanes and aviation engines. This lack of subsidy and fixed government policy relieved the American manufacturers of the necessity of an organized effort to sell unsuitable material to unwilling or uninterested buyers. Therefore, during that period immediately after the war, little American effort was made to cultivate the foreign field. Such sales effort as was made represented the sporadic attempt of individual manufacturers to sell planes and engines direct to a market which already existed, and upon the merits of the equipment itself.

What happened during the period between the Armistice and the present time is known to all who have followed the course of business in the foreign field.

A hasty review will perhaps refresh the memory and explain the merits of the program by which American manufacturers are gradually acquiring a valuable leadership. If our industry is tending toward healthy success, it is largely because of common sense and fair dealing, which are always assets in establishing and conducting worth-while business dealings.

Aviation, among the nations of Europe, has from the first been considered and treated primarily from its military aspects. For this reason, rather than from a desire to promote civil air transportation, European governments have consistently subsidized the aviation industry with a view to strengthening their offensive and defensive military machines. Every new type of plane, with one exception, has been projected first and foremost for its military adaptability. The exception is in the field of the light sport plane, from which it has been hoped to encourage sport flying as a means to develop large reserves of those who could become military aviators in times of need. A study of European planes will confirm this point of view. Often commercial advantage and utility have obviously been sacrificed for military advantage. Such a policy could not help retard healthy progress in commercial aeronautic design.

Hand in hand with this unconcealed intention came the necessity to dispose of obsolete war stocks. Any outlet was considered good if it absorbed the useless equipment in return for sufficient cash. In the case of nearly every European government, the sales organization consisted of an official or semi-official military or naval mission. The costs, in addition to the pay of the personnel, were usually defrayed in full by the government itself. Also, the method proved highly successful for a number of practical reasons, foremost among which were the prestige enjoyed by the mission and the popular appeal of pilots who had won fame in the World War. Uniforms lent to their glamor, and their skill as aviators made undoubted contribution to their success in the accomplishment of their purpose.

In commenting upon the inevitable outcome of this situation, it is sufficient to quote the illustrious German poet who observed that "the mills of God grind slowly, but they grind exceeding fine."

Meantime, the situation of American manufacturers was totally different. At the close of the war the aviation industry was thrown brutally back upon its own resources and ingenuity. Contracts were canceled by the Government and many manufacturers were forced out of business. Those who remained found it necessary to arrange their program for the conduct of business without government subsidy. Luckily for the future of aviation, the Army and Navy adopted a program of developing leadership in the design of airplanes and engines. This paid the way for costly experimentation and provided enough work to keep factory staffs together.

(*Continued on page* 266)

BASIC FORMS FOR OPERATIONS

By E. G. Rhenstrom

Chief, Technical Staff, Southern Air Transport, Inc.

IN the operation of airplanes the law requires that an accurate record on planes and engines be maintained. Within the organization or company operating aircraft commercially, these same records are necessary; and in addition, for business accountancy, complete and accurate information with reference to operations is needed.

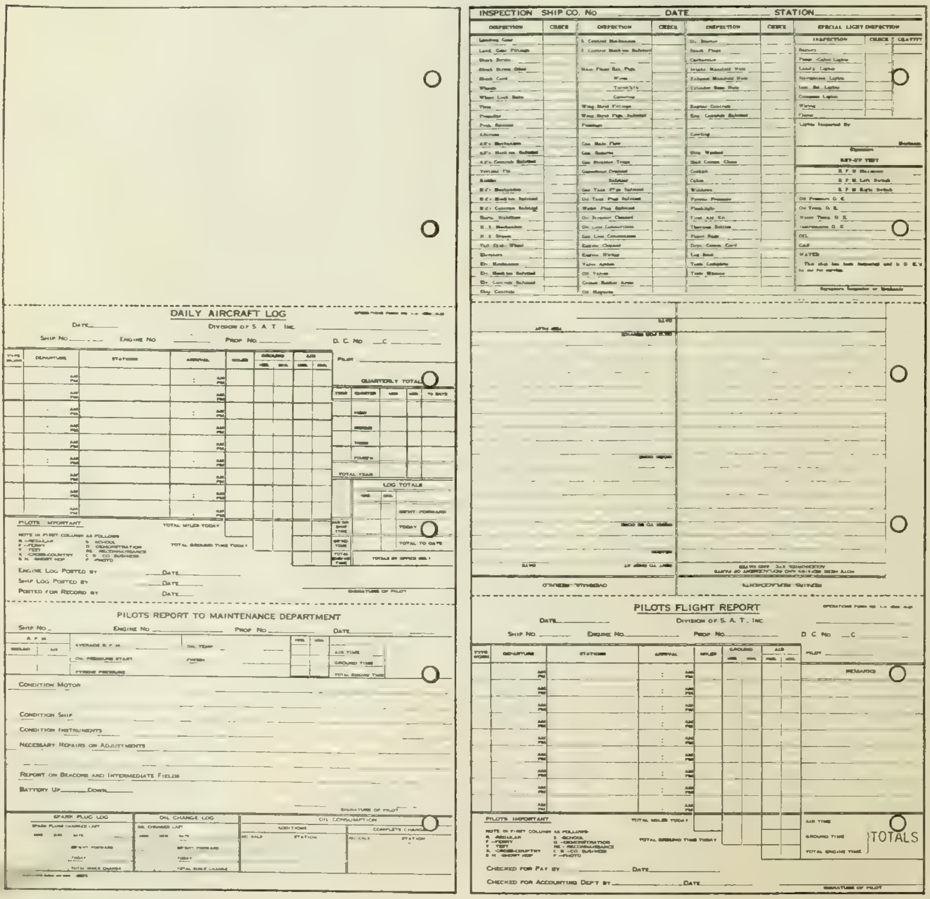
The flight activities of the subsidiary operating companies of Southern Air Transport, Inc., include practically every commercial phase of flying, with an organization subdivided into divisional or scheduled operations, and branch or base operations. It was necessary, therefore, to devise a system by which we could obtain accurate information on all flights for the general offices, operation office and maintenance departments. Two forms developed and now used by the Southern Air Transport system are described in this article.

The basic information concerning a flight operation comes necessarily from the pilot, or by authority of the pilot, from the co-pilot on multi-engined airplanes. Because of the cramped "bookkeeping" conditions in a cockpit or pilot's compartment, the vibration of his "knee-desk," and the manifold duties and responsibilities of the pilot while at a station, it is imperative to simplify his job in order to get accurate and complete information. In the operating divisions and branches of Southern Air Transport, we have been operating single-engined airplanes and, therefore, Operations Form 1-A (see figure 1) or the basic log form is designed for single-engined airplanes. But little change is necessary, however, to make the form suitable to multi-engined airplanes.

Unfolded, this form is 16⅜ inches long by 8⅜ inches wide. Folded and prepared for the pilot's "board," it is 10⅞ inches long and 8⅜ inches wide which is the same size as Post Office Form 2702. The reason for this size is that a receptacle was designed to hold these forms while en route or "in work."

Explanation of the Sections of the Form

FRONT SIDE (figure 1). The *Daily Aircraft Log* section was designed to be the original because it is the official record of the airplane, and as its name indicates, the log of the airplane. On this is noted the operating division or subsidiary company of Southern Air Transport, the date, ship number, engine number, propeller number, Department of Commerce license number, and the pilot's name. If the log is for a scheduled mail or passenger run, the stations are either stamped in or written in pencil. The type of work to be done is inserted by the pilot, who writes in the key letters designated in the lower left of this section. The log totals are carried forward under the proper headings. For quick reference the quarterly totals are posted. The quarterly and log totals are worked by the office.



DAILY AIRCRAFT LOG

Date
Division of S. A. T. Inc.
Ship No. Engine No Prop No. D. C. No __C
Pilot
Quarterly Total
Total Year
Log Totals
Brt. Forward
Today
Total to Date
Pilots Important
Total Miles Today
Total Ground Time Today
Engine Log Posted by ____ Date
Ship Log Posted by ____ Date
Posted for Record by ____ Date
Signature of Pilot

PILOTS REPORT TO MAINTENANCE DEPARTMENT

Ship No. Engine No Prop No Date
R. P. M.
Average R. P. M.
Oil Temp.
Oil Pressure Start
Finish
Air Time
Ground Time
Total Engine Time
Condition Motor
Condition Ship
Condition Instruments
Necessary Repairs or Adjustments
Report on Beacons and Intermediate Fields
Battery Up____ Down____
Signature of Pilot
Spark Plug Log
Oil Change Log
Oil Consumption
Additions
Complete Change
Station

INSPECTION SHIP CO. No ____ DATE ____ STATION ____
Inspection
Check
Special Light Inspection
Oil
Gas
Water

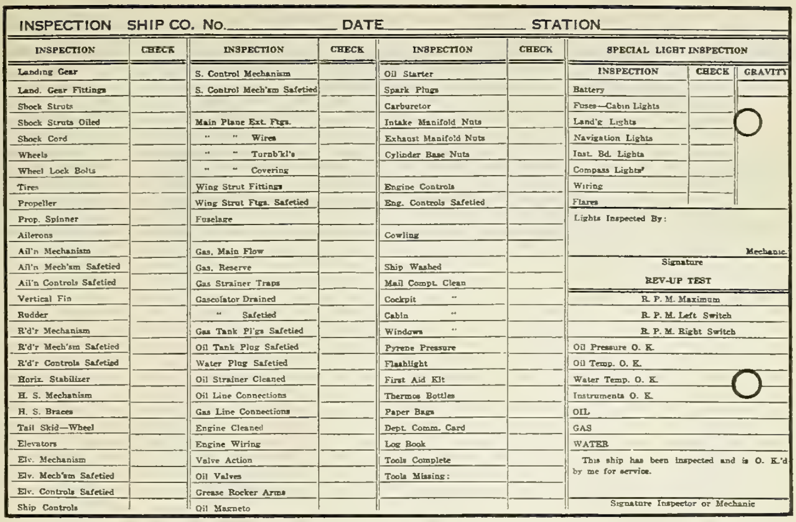
PILOTS FLIGHT REPORT

Date
Division of S. A. T. Inc.
Ship No. Engine No. Prop No. D C No __C
Type Work
Departure
Stations
Arrival
Miles
Ground
Air
Pilot
Remarks
Pilots Important
Note in first column as follows:
R -Regular
F -Ferry
T -Test
X -Cross-country
S H -Short hop
S -School
D -Demonstration
RE - Reconnaissance
C B -Co. Business
P -Photo
Total Miles Today
Total Ground Time Today
Air Time
Ground Time
Total Engine Time
TOTALS
Checked for Pay by ____ Date ____
Checked for Accounting Dept by ____ Date ____
Signature of Pilot

Figure 1, showing (left) front side and (right) reverse side of Form 1-A, which is on yellow paper

The *Pilot's Report to Maintenance Department* section carries the ship number, engine number, propeller number and date. The flying and ground time on the engine are transcribed from the *Daily Aircraft Log* section. The bottom part of this section is designed to furnish the maintenance department with necessary accurate information on spark plugs, oil changes and oil consumption.

REVERSE SIDE (figure 1). The *Pilot's Flight Report* section at the bottom of the reverse side is identical with the *Daily Aircraft Log* section, except that it has a heading for remarks instead of log totals. This arrangement is provided



INSPECTION SHIP CO. No.________ DATE________ STATION________

INSPECTION	CHECK	INSPECTION	CHECK	INSPECTION	CHECK	SPECIAL LIGHT INSPECTION		
						INSPECTION	CHECK	GRAVITY
Landing Gear		S. Control Mechanism		Oil Starter				
Land. Gear Fittings		S. Control Mech'sm Safetied		Spark Plugs		Battery		
Shock Struts				Carburetor		Fuses—Cabin Lights		
Shock Struts Oiled		Main Plane Ext. Ftgs.		Intake Manifold Nuts		Land'g Lights		
Shock Cord		" " Wires		Exhaust Manifold Nuts		Navigation Lights		
Wheels		" " Turnb'kl's		Cylinder Base Nuts		Inst. Bd. Lights		
Wheel Lock Bolts		" " Covering				Compass Lights		
Tires		Wing Strut Fittings		Engine Controls		Wiring		
Propeller		Wing Strut Ftgs. Safetied		Eng. Controls Safetied		Flares		
Prop. Spinner		Fuselage				Lights Inspected By:		
Ailerons				Cowling				
Ail'n Mechanism		Gas, Main Flow				Mechanic		
Ail'n Mech'sm Safetied		Gas, Reserve		Ship Washed		Signature		
Ail'n Controls Safetied		Gas Strainer Traps		Mail Compt. Clean		REV-UP TEST		
Vertical Fin		Gascolator Drained		Cockpit "		R. P. M. Maximum		
Rudder		" Safetied		Cabin "		R. P. M. Left Switch		
R'd'r Mechanism		Gas Tank Pl'gs Safetied		Windows "		R. P. M. Right Switch		
R'd'r Mech'sm Safetied		Oil Tank Plug Safetied		Pyrene Pressure		Oil Pressure O. K.		
R'd'r Controls Safetied		Water Plug Safetied		Flashlight		Oil Temp. O. K.		
Horiz. Stabilizer		Oil Strainer Cleaned		First Aid Kit		Water Temp. O. K.		
H. S. Mechanism		Oil Line Connections		Thermos Bottles		Instruments O. K.		
H. S. Braces		Gas Line Connections		Paper Bags		OIL		
Tail Skid—Wheel		Engine Cleaned		Dept. Comm. Card		GAS		
Elevators		Engine Wiring		Log Book		WATER		
Elv. Mechanism		Valve Action		Tools Complete		This ship has been inspected and is O. K.'d by me for service.		
Elv. Mech'sm Safetied		Oil Valves		Tools Missing:				
Elv. Controls Safetied		Grease Rocker Arms						
Ship Controls		Oil Magneto				Signature Inspector or Mechanic		

Figure 2. Duplicate inspection form, the same size as one section of Form 1-A

so that the pilot may make special notations for the office and accounting department as to irregularities or special expenditures and revenues away from a regular base.

The middle section, which is on reverse side of the *Daily Aircraft Log* section, is for notations regarding repairs, replacements, overhauling and rebuilding.

The *Inspection* section is broken up into divisions—all important parts of the airplane and engine, as well as Special Light Inspection and Rev-up Test with their respective sub-divisions. It has been found in practice that this arrangement assists the inspectors and mechanics and reduces errors.

The color of this form is a yellowish-buff, because writing and notations are exceedingly legible on it and paper of this color takes carbon very well.

Figure 2 shows a form identical with the *Inspection* section of figure 1—Reverse Side. There is no printing on the reverse side of this form, which is printed on thin white stock of a medium grade.

Note that all sections are punched for insertion in binders. The *Daily Aircraft Log* and *Pilot's Flight Report* are kept in binders. The *Pilot's Report to the Maintenance Department* is kept on a record board in the maintenance department. The white copy of the *Inspection* record is also placed on a board for temporary record.

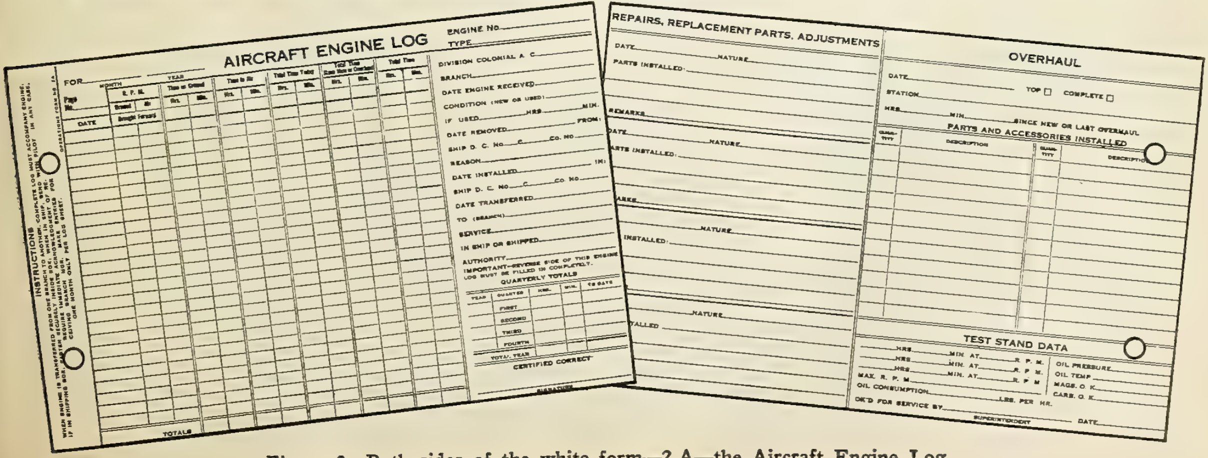
Mechanics of the Basic Form

Operations Form 1-A is perforated as shown in figure 1. The first operation is that of maintenance or inspection during which the inspector folds the bottom section up—figure 1, Front Side. This presents the *Inspection* section in the proper position. The white copy of the *Inspection* form is placed directly under the *Inspection* section on Form 1-A. By using a carbon paper, we obtain a copy of the inspection checked and signed by the inspector. After inspection is made, the initials of the inspector are required for each item in addition to the signature for both airplane and engine inspection and *Special Light Inspection*. The white or loose *Inspection* form (figure 2) is retained in the maintenance department and might be termed an "insurance record." This section is of value if an accident occurs and records of line inspection on basic form are lost or destroyed. By this form the office record shows whether the airplane was properly inspected and OK'd for service before flight.

After the *Inspection* section is filled out properly, it is folded down. The top section, as shown in figure 1, Front Side, is folded under; which brings the *Pilot's Flight Report* section directly under the *Daily Aircraft Log* section. A carbon is inserted in order to get the same impressions as are made on the *Daily Aircraft Log*. At the field office, the data required on the *Daily Aircraft Log* are filled in completely, including the stations if a scheduled flight. When this is completed, it is placed in the holder and binder ready for the pilot's acceptance.

The pilot accepts the airplane if the record is correct and inspection is OK. It is his duty to mark in the type work and departures and arrivals, miles, ground time, air time, and to sign the *Daily Aircraft Log* section. It is the pilot's duty to fill in completely the *Pilot's Report to Maintenance Department,* except the spark plug log and oil log. He must note any addition or change of oil if away from a terminal. If additions and oil changes are made at terminals, notation is made by the field manager or the maintenance department. Oil additions or changes carry the date of report, since one

(*Continued on page* 242)



AIRCRAFT ENGINE LOG

ENGINE No.____

TYPE____

INSTRUCTIONS

OPERATIONS FORM No. 2A

FOR____ MONTH____ YEAR____

Page No.

DATE

R. P. M. Ground Air

Brought Forward

Time on Ground Hrs. Min.

Time in Air Hrs. Min.

Total Time Today Hrs. Min.

Total Time Since New or Overhaul Hrs. Min.

Total Time Hrs. Min.

TOTALS

DIVISION COLONIAL A. C.____

BRANCH____

DATE ENGINE RECEIVED____

CONDITION (NEW OR USED)____

IF USED____HRS.____MIN.

DATE REMOVED____FROM:

SHIP D. C. No.____C____CO. NO.____

REASON____IN:

DATE INSTALLED____

SHIP D. C. No.____C____CO. NO.____

DATE TRANSFERRED____

TO (BRANCH)____

SERVICE____

IN SHIP OR SHIPPED____

AUTHORITY____

IMPORTANT—REVERSE SIDE OF THIS ENGINE LOG MUST BE FILLED IN COMPLETELY.

QUARTERLY TOTALS

YEAR	QUARTER	HRS.	MIN.	TO DATE
	FIRST			
	SECOND			
	THIRD			
	FOURTH			
TOTAL, YEAR				

CERTIFIED CORRECT

SIGNATURE

REPAIRS, REPLACEMENT PARTS, ADJUSTMENTS

DATE____NATURE____

PARTS INSTALLED:____

REMARKS____

OVERHAUL

DATE____ TOP ☐ COMPLETE ☐

STATION____

HRS.____MIN.____SINCE NEW OR LAST OVERHAUL

PARTS AND ACCESSORIES INSTALLED

QUANTITY	DESCRIPTION	QUANTITY	DESCRIPTION

TEST STAND DATA

____HRS.____MIN. AT____R. P. M.

____HRS.____MIN. AT____R. P. M.

____HRS.____MIN. AT____R. P. M.

MAX. R. P. M.____

OIL CONSUMPTION____LBS. PER HR.

OIL PRESSURE____

OIL TEMP.____

MAGS. O. K.____

CARB. O. K.____

OK'D FOR SERVICE BY____ SUPERINTENDENT DATE____

Figure 3. Both sides of the white form—2-A—the Aircraft Engine Log

Members of the Exchange Club of Sacramento, California, painting on a roof an air-marker as a guide for fliers which can be seen for several miles

EXCHANGE CLUBS AID AVIATION

By J. P. Muller

President, National Exchange Clubs

PROVIDING air service for a nation of 120,000,000 people is America's greatest task; a mighty undertaking that will require the combined efforts of national and state governments, of communities and individuals, as well as of all engaged in the industry—yet one in which every forward-looking man and woman can have a part.

Airlines cannot exist without the active support of the millions on whose patronage they must depend. Most of them cannot be created without the coöperation of the numerous communities along the lines. Aviators flying across country must look for guidance largely to highways and railroads, the markers, lights and names designating towns and cities, and pointing to landing fields.

Airports are being constructed by cities and operating companies at strategic points. The Federal Government is erecting searchlight and flashlight towers, installing radio beacons and other equipment of the best type to direct the flier along these air mail trunk lines.

But many thousands of miles are still unmarked. In broad stretches of country, landing fields are few and far between. The average city or town must construct its own airport, must erect whatever markers, lights or beacons are required to make safe the path of the flier and enable him to land without damage to his ship. In providing these essentials, civilians can lend invaluable aid. In showing how that can be done in a practical way the experience of the Exchange Clubs may be of interest and value.

Like the vast majority of laymen, we view this matter from the standpoint of the average man. Our 800 Exchange Clubs in forty-four states represent a typical cross-section of American citizenship. Located in various parts of the Union, service clubs like ours need a national objective.

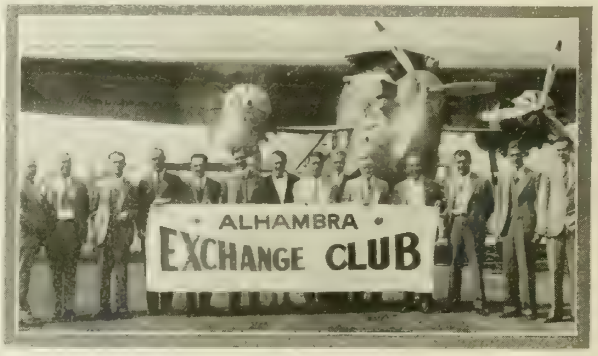
Nothing we have ever undertaken has been so avidly received by our members as aviation. In entering this field we were "innocents abroad," having much to learn. But, seeking solely to aid the cause as a whole, having no selfish purpose to serve, we had the advantage of the outside point of view. We had no axe to grind. We adopted definite projects of genuine usefulness which any public-spirited men and women could by energetic effort accomplish. The results speak for themselves.

This began in the most unobtrusive way. Lieut. Walter Hinton, pilot of the NC-4 with Commander Albert C. Read in the first flight across the Atlantic, was speaking to the New York Exchange Club. In flying across the wilds of Canada and South America, he said, he could not help but think continually about where he could land if he had to come down. His picture of flying's future aroused intense interest. We wanted to have a part in it.

"What can our Exchange Clubs do to aid aviation?" we asked him with more than idle curiosity.

"Get landing fields," was Hinton's reply.

That appealed to us as something which we could do. The work was taken up at once. In a few months, clubs in twenty states were working to secure landing fields for their own cities. With growing interest, we began to study the entire subject. A survey disclosed that this was one field which no other service clubs had entered.



Members of the Alhambra, Calif., club after a flight to Newport Beach in a Western Air Express Fokker

Speakers representing all branches of aeronautics were invited to address us, various phases were discussed. Anton Heinen, the Zeppelin expert and other dirigible engineers; Major General John F. O'Ryan, president of the Colonial Airways; Colonel Harold E. Hartney, who commanded the First Pursuit Group of the American Expeditionary Force; Lieut. Leigh Wade, the 'round-the-world flier, and many others, spoke to us.

When the National Exchange Club met in convention at Toledo, in July, 1928, aviation was the principal topic. Amelia Earhart, who had just flown across the Atlantic in the *Friendship*, was our guest. The New York delegation, headed by Walter W. Hubbard, introduced a resolution, unanimously adopted, setting forth the following program of "Service to Aviation":

"The establishment of permanent landing fields within easy access of the business sections of towns and cities.

"The proper equipment of such landing fields, with particular attention to field marking and night lighting.

"The establishment and identification of emergency landing fields wherever possible.

"The marking of the roofs of buildings with the name of the town or city for identification by aviators.

"Patronage of air transportation for mail, express, freight and passengers.

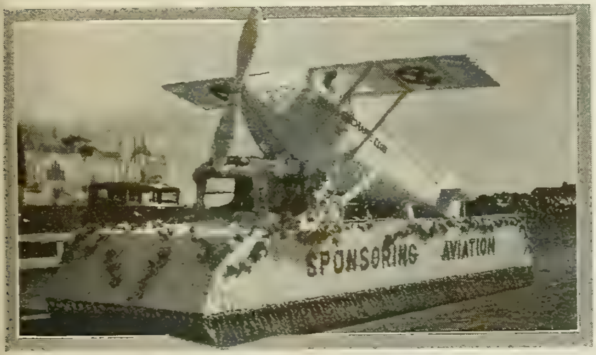
"Whole-hearted coöperation with the Government in its

Poster sponsored by the Houston Exchange Club

development of air transportation."

Exchange entered upon the task with an enthusiasm that soon brought results. Mountain Home, Idaho, and Canestota, New York, led the way in establishing landing fields. Towns from Michigan to Texas followed. Before long the movement was proceeding in more than 200 communities throughout the United States.

In some cases, Exchange took the initiative. In others, the clubs gave their support to whatever groups were working toward that end. There was no question of rivalry or credit. Our purpose was to lend a helping hand wherever we could. Club and public meetings were held, officials and local governments stirred to action. Petitions were circulated, funds raised, the coöperation of various elements enlisted. Elaborate floats, symbolizing various phases of aviation, were placed in parades. Use of the air mail was stimulated. Air mail dedications were turned into celebrations, and other promotions made picturesque events. This constant agitation, urging the importance of air facilities, had its effect on public opinion. Whole communities were enthused. By united effort, landing fields, beacons, markings and other essentials were provided.



Float sponsoring aviation as it appeared in a Tampa parade

A national gathering to bring together the leaders of business and aviation was proposed soon after various delegations returned home from Toledo. The result, six months later, was the "Progress Dinner" given by the united business interests of America to the aviation industry. That gathering at the Commodore Hotel, New York, on January 29, 1929, which the Exchange Clubs were privileged to sponsor, has been termed "The introduction of aviation to Big Business." Too ambitious a designation perhaps. But it was a notable occasion, bringing together a thousand leaders of aviation and other industries —financiers, railroad presidents, airplane designers and manufacturers, airline operators, executives representing every phase — and enabling them to get better acquainted.

With Dr. John H. Finley as toastmaster, Postmaster General Harry S. New told of the growth of the air mail; Assistant Secretary of War F. Trubee Davison described Army air activities; Hon. William P. MacCracken, Assistant Secretary of Commerce for Aviation, discussed "Air Commerce"; David Lawrence, editor of the *United States Daily,* spoke of government and industry; and Merle Thorpe, editor of *The Nation's Business,* extended a welcome to aviation on behalf of the United States Chamber of Commerce.

Major General James E. Fechet, Chief of the Army Air Corps, introduced the *Question Mark* fliers who had just made their record-breaking refueling flight. Many other noted aviators were present. Radio messages from Commander Richard E. Byrd and Sir George Hubert Wilkins, at their Antarctic bases, added to the interest.

Pacific Coast "Exchangites" and clubs across half the continent joined in another national project. The Women's Air Derby from California to Cleveland was sponsored by the Santa Monica Exchange Club. Various clubs along the route acted as local hosts and offered prizes. Exchange also sponsored the "Achievement Dinner," at the Statler Hotel, in Cleveland, August 26th, during the National Air Races and Aeronautical Exposition. Broadcast by radio over national hook-ups, covering the entire United States and extending to Canada, over the Columbia chain, these events attracted wide attention. Millions listened in on the proceedings and found a fresh interest in aviation.

The tangible results have been a surprise even to ourselves. Reports made at our recent convention in Jacksonville, Florida, held October 6th to 9th, showed that our 800 clubs in forty-four states had taken part in no less than 851 projects for the advancement of aviation, an average of more than one to each club. These include: 201 landing fields established and equipped, 223 air-markers or signal lights placed, 217 air mail dedications or other promotional events sponsored, and 210 landing fields and other projects planned and in progress.

That is the result of eighteen months' effort. It is but an introduction to the larger activities upon which we are entering.

Voting to continue aviation as (*Continued on page* 230)

Left, Exchangites at Jacksonvlile, Fla., help encourage the use of air mail; center, Louise Thaden being greeted at Cleveland as winner of Women's Air Derby, sponsored by Exchange Clubs; right, Seattle Exchange display to stimulate interest in air mail

SELLING AIRPLANES TO BUSINESS HOUSES

By Russell L. Putman

THE unusual history of flying, the recent years when demand has far exceeded production, has tended to make us forget that which is of cardinal importance to every business—that, after all, the real purpose of our business is to sell a service or a product; and our success over any extended period of time can only be measured in terms of the profit and satisfaction which our buying public derives from our service.

Transportation organizations have frequently been criticized—and no doubt with some justice—for their failure to give adequate consideration to their customers. Numerous instances are cited as evidence that the railroads are so busy hauling trains with engines that they fail to consider the needs of shipper and passenger. I dare to be accused of being trite in reminding you that all your enterprise and skill are of real value commercially only in so far as they enable us of the lay public to use your ships and your service. We are your market.

In discussing a single phase of airplane selling, such as selling to business houses, we must of course remember that such activity must fit into the selling set-up as a whole. Neither time nor space will permit a thorough analysis or exposition of the whole. Briefly, what I shall discuss may be summed up under three heads:

(1) The attitude of business toward flying and its knowledge of the airplane as a practical business tool

(2) The way in which manufacturers can capitalize on the needs of business to sell airplanes

(3) The sales organization and activities required to sell airplanes.

The thoughts, ideas and facts of my discussion are of many years' accumulation and from many sources. They are from wartime participation in flying; from several years' personal use of the airplane in everyday business travel, totaling over 50,000 miles in forty States of the Union; from discussions of aviation with hundreds and thousands of business men, and from talks and correspondence with scores of aircraft manufacturers and operators who have kindly given me their ideas from their own experiences. Obviously, great masses of data cannot be presented; the industry is yet too young and the sum total of experience is too limited. Moreover, the statistics of today will be obsolete tomorrow. But we can read the signs of the times and interpret them as they indicate trends. This I shall try to do.

Rather curiously, there is a marked differentiation in the business man's attitude toward flying in general and his consideration of the airplanes for his own use. His attitude toward flying is typical of the great mass of the public. He feels it's a great achievement, a spectacular activity and a romantic thrill. Its speed interests him, and he feels sure that flying will make great strides and achieve great things. His thinking is, of course, colored by the unique history of flying, its early days of daredevil exhibition, its spectacular and dangerous use in war-time, and still more recently the great adventures of trans-oceanic fliers. So today, while he confidently predicts great growth in aviation enterprises and invests his dollars in aviation stocks with the hope of riding up with the industry, he considers flying a thing apart from himself. Someone else will do the flying. Someone else will pay the fares and ship the goods that will make airlines profitable, and hence bring profits to manufacturers of ships and engines. His is, by and large, a vicarious participation in the growth of the industry.

When you talk to the business man of the airplane as an aid in his own business, he immediately gives voice to new objections and new resistances. Our own experience in adapting the airplane to our business over two years ago is perhaps typical of thousands of concerns. When we first proposed that we buy a ship and place it in the regular service of our company for executive travel, only one of our officials had ever flown for more than a thrill hop. Instantly the objection of the airplane's danger was brought up. Could we risk the lives of any of our executives or men in flying? Was a business organization justified in asking or even allowing its employees thus to endanger themselves in the company's service? And the wives of officers and men had their say. They, too, felt that an unusual risk was being asked of their husbands. All the statistics and the confidence of those who knew flying had but little effect in changing this fixed idea in the minds of all concerned.

Secondly, there came the question of cost. The original price of the airplane was entirely out of line with anything which the officials were accustomed to use for travel purposes. Moreover, the cost of pilot and operating charges raised the cost figures to a total that seemed staggering. They could not reconcile such expenses in terms of train or automobile travel which officers and men had used to date.

Thirdly, it was questioned whether, with all the airplane's speed, it could really be of any great value in increasing the amount of work actually done. How could it be used? How much would weather interfere? At one time it was even suggested by executives well informed on most business matters that, of course, the airplane could not be used except in the summer months and must of necessity be laid up during the winter, even as our early automobiles used to hibernate, mounted on jacks under muslin covers. In short, there was little appreciation of what the airplane could do, though, of course, the advertising aspect was considered but immediately discounted as of questionable value at this comparatively late date in the airplane's history.

Three outstanding resistances, then, characterize their attitude toward the airplane: (a) fear, (b) high cost, and (c) lack of understanding of the airplane's use. These resistances are far greater than in the case of almost any other business tool, and they are to be found in practically every business organization. The element of fear is all too well known. The factor of cost is borne out by our everyday conversations with any business man, in his attempts to reconcile the cost of air travel with that of train or motor car.

In the matter of fear, high cost and use, numerous letters which we received from business executives over the country during the time we operated our airplane give evidence of their lack of information, yet indicate that they are interested in learning. Here is an excerpt from a typical letter, from the president of one of the largest steel companies:

"While costs of operation and all the other factors are naturally of very great importance, the one outstanding point in which I am particularly interested at this stage of the game is the factor of safety.

"The science of air trans-

(*Continued on page* 250)

SAFE LANDINGS

where ships never dared to land before

AIRWHEELS bring new safety to forced landings. These big soft rolling rubber pillows take the place of the former wheel and tire. They operate at pressures as low as 5 pounds —up to 15. They spread out—mushroom—when they touch the ground.

Repeated landings have been made with Airwheels on plowed ground—on swamp land—on soft sand and wet fields. They land with equal ease and safety on snow.

On the normal field, tests also indicate that Airwheels can get the plane into the air in a shorter distance—and they mean quicker stops when the plane comes back to the ground. A ground loop is almost impossible with Airwheels even if you try.

Extensive tests have been made in landing with one and both Airwheels flat—and even with holes cut deliberately in their side walls—no trouble was experienced in handling the plane.

Airwheels have a streamline shape—wind tunnel tests indicate that they reduce wind resistance.

Goodyear builds the complete Airwheel, hub and brake combination. No other wheel or hub is required. The brakes, because they are self-centering, cannot lock — they release the instant pressure is released—an added factor of safety to top off all others.

Airwheels are now made for ships weighing 1000 to 20,000 pounds. For information or engineering assistance in equipping your future ships, write Aeronautics Department, Goodyear, Akron, Ohio or Los Angeles, California.

GOODYEAR

Everything in rubber for the airplane

PERSONAIRLITIES

by Caldwell

The Great Behncke, hypnotizing snipes

HERE is THE GREAT BEHNCKE, Aviator, Inventor, and Soldier of Misfortune, snapped in a moment's recreation holding the sack for a party of intrepid snipe hunters. THE GREAT BEHNCKE has changed the age old system of snipe snaffling, with which, no doubt, our six readers are familiar. That was known as the sack and lantern method: the lantern was placed near the lair or habitat of the snipe in such a manner that the entrance was illuminated by a lantern, or some leading literary light. This allowed the snipe to enter without stumbling. Behncke has changed all that, and it is now largely a matter of mental telepathy on the part of the sack-holder. Mind over matter is about what it amounts to, if anything. In the picture THE GREAT BEHNCKE, who is also a night pilot on the Chicago-Omaha run, is shown telepathizing a snipe in full, or half full, flight, causing the snipe, baffled and discouraged, to fly into the sack and drop out of a hole in the bottom into the telepathizer's cap. This no doubt causes the more or less tense expression on the mobile countenance of SACK-HOLDER BEHNCKE.

* * *

Joe Glass

THE determined and serious looking gentleman to your left has every reason to look serious. He is none other than Pilot Joe Glass, the dynamite king, champion nitroglycerin transporter of an admiring world. In August, 1927, he transported by airplane one thousand quarts of liquid nitroglycerin from Matamoras, Mexico, to the oil fields of Salinas and Ebano, near Tampico, Mexico. And by nitroglycerin I am not referring to the quarts of Chicago liquids intended for drinking and sometimes facetiously mentioned as nitro. This nitroglycerin was the real stuff, the explosive, which is set off, I believe, by giving it a gentle bump, or tap, or shove. I don't know much about nitroglycerin but I understand that you merely have to lean against a quart of nitro, or look sternly at it, and it goes off with a loud disheartening *boom*, after which you are but a memory, sweet or sour, as the case may be. And this is the stuff that the bold Joe sadly and seriously shoved off into the air with! Joe, I admire your courage, but stay away from me in the air. You might happen to sneeze when you were passing me.

I asked Joe about these flights, and he replied: "The flights were made over a country practically devoid of landing fields and civilization, with the exception of a few scattered Indian settlements, the inhabitants of which never missed a chance to fire a shot at any passing airplanes, or 'devil-birds,' as they were known to them. It was not an infrequent occurrence to find bullet holes in the planes after flights over these inhospitable settlements; and I actually counted sixteen rifle bullet holes in the plane after one flight in which I had been forced to a low altitude by a low ceiling. It is needless to say that I avoided the settlements as much as possible when carrying the nitro.

"The transportation of the nitroglycerin was accomplished in thirteen flights made on thirteen consecutive days." (Evidently Joe has no superstitions!) "Eighty quarts were carried on each of the first twelve flights and forty on the last and thirteenth. On the thirteenth flight a forced landing was experienced shortly after the take-off, but I managed to get back to the field. I used a Standard with Hispano motor and wore a Russell parachute, but had not reached sufficient altitude to get out with the chute when the only forced landing occurred." (And it occurs to me that Joe was extremely lucky not to have got out. I see very little comfort in coming down nicely in a chute, to meet an explosion of nitroglycerin on its way up!) "The distance from Matamoras to Salinas and Ebano is 270 miles air line, making a total distance of 3,510 miles which was flown with the nitro on board." Which, I may add, is exactly 3,510 miles farther than I would have flown with the same intriguing load. Still, my experience with detonating liquids is limited to one ride in a Ford sedan, when prohibition men stopped and searched me. They found one bottle of home-made beer, which, when they picked it up, went off with a swishing sound and bubbled away to froth. The officer held the foaming bottle away from him, and laughed. "There goes the evidence!" he said. "I guess the only charge I could hold you on is for transporting explosives without a license!"

Joe Glass learned to fly at March Field, Riverside, California, in 1918, but he escaped from the Army in 1920, there not being enough nitro in the thing. He barnstormed in Texas and Oklahoma for one year, enduring many hardships, including a lunch at Muskogee. He was chief pilot for Compania Mexicana de Aviacion, which is the quaint Spanish name for the Mexican Aviation Co., and made the first flight with mail from Mexico City to Tampico, after which he played about with the aforementioned explosives, survived, and returned to the States in 1927 to operate Houston Airways, Inc. He is now with Texas Air Transport at Fort Worth, operating Contract Air Mail Routes 21 and 22. The only explosive carried is an occasional speech by Tom Heflin.

* * *

Lieut. E. B. Koger

LIEUTENANT ESTEN B. KOGER, Commander, U. S. Naval Reserve Aviation Base at Long Beach, Cal., is one of the oldest of Naval Reservists on active flying duty, and he is the oldest Naval Test Pilot still living and able to do his stuff. "I don't ever hope to be the Navy's most outstanding pilot," he writes. "All I want is to be the oldest pilot." He very nearly failed to attain that status, for: "On Sept. 17, 1919, Lieut. Comdr. Eddie McDonnell, U.S.N., and I fell in a weed patch back of Hog Island, Philadelphia, in a Loening monoplane. Eddie forgot to turn on the gas in the main tank; result, both of us in hospital for eight weeks, nearly our finish. Eddie got out shortly afterwards, went into the banking business in New York, and now spends the summers in Canada and the winters in Palm Beach. In Sept., 1920, while testing a Martin Bomber at Glenn Martin's plant, Cleveland, Ohio, the engines died, not being rigged to burn water. Net result, one Martin Bomber wiped off the Navy Lists—$65,000 in the red. No injury

(Continued on next page)

Planes now styled like motor cars with finishes of unique durability

Scientific aircraft finishes by du Pont offer ultra-modern beauty combined with unprecedented serviceability

BEYOND the first experimental stage—well launched along sound commercial lines—aviation today reflects the refining influences of competition. Comfort, style and durability gain new importance in aircraft construction. Suitable new materials become essential.

To meet these new high standards du Pont laboratories are constantly developing scientific finishes and fabrics of greater beauty, higher durability. Du Pont Wing Dopes, standard Army and Navy finishing materials, and many other du Pont products were built specially for air service. So thoroughly have they been tested in the laboratory and in gruelling flying service, that you can safely base your whole finishing schedule on scientific du Pont systems.

Expert Advice on Color Styling

With the introduction of Duco for use in homes, on automobiles and other manufactured products, du Pont established a special department for the study of color trends and color fashions. The du Pont Color Advisory Service is in constant touch with aircraft styling in both America and Europe. It will gladly cooperate with you in planning up-to-the-minute harmonies for your ships.

DU PONT
REG. U.S. PAT. OFF.

Complete information on any du Pont product for airplane use will be furnished either by mail or by a qualified representative.

AIR-TESTED FINISHES

Du Pont Dopes—The du Pont line of aircraft finishing materials includes clear, semi-pigmented and pigmented dopes. They are all tested formulas of remarkable durability—proven in service as well as in the laboratory. Flexible and highly blush-resistant, the Army and the Navy have approved these products for their requirements. Available in a wide variety of highly visible colors.

Du Pont Paints and Varnishes—Du Pont chemists have developed a complete line of paints and varnishes including Dopeproof Paint, Spar Varnishes, Fuselage Varnish and Aircraft Enamels.

E. I. DU PONT DE NEMOURS & CO., Inc.
Industrial Finishes Division, Parlin, N. J.
2100 Elston Ave., Chicago, Ill. 351 California St., San Francisco, Cal.
Flint Paint and Varnish Limited, Toronto, Ontario, Canada

MEMBER OF AERONAUTICAL CHAMBER OF COMMERCE

(*PersonAIRlities continued*)

to pilot or passengers with exception of Lieut. C. B. Harper, Bureau of Construction and Repair, who received an injury to his back from which he has never fully recovered."

In 1918 Lieut. Koger was on Patrol Duty at Hampton Roads with Ensign Sullivan of New York. On Sunday, June 9, they spotted a submarine. The following is from Koger's flight log: "On this date Sullivan and I in our trusty R-6 seaplane sighted submarine and dropped bomb, evidently scoring a clean hit as was evidenced by oil appearing on the water for several days thereafter. So far no official action was taken by the Navy to make this official." Naturally the Navy wouldn't care to admit that a mere airplane had sunk a boat, even an enemy boat. They probably accounted for the oil on the water by the assumption that a grease monkey from the Air Station had been in swimming.

Lieut. Koger was born on a farm near Decatur City, Iowa, on May 21, 1881, and spent the early years of his life waiting for farm relief. His former neighbors are still waiting for it. But Koger, after collecting all the education afforded by the county school at Hickory Grove and the Decatur City High School, shook the dust of those parts from his feet and migrated to Hennessey, Oklahoma, in 1901, and from there to Dallas, Texas, and thence to Ardmore, Okla. During that time he drove the first automobile from Dallas to Denison, Texas, and was active in the motor car business until 1916, when he joined the Pioneer Battalion of Engineers, Pennsylvania National Guard at Scranton, Pa., and was sent to El Paso, Texas, when the little affair with Mexico broke out. While the Army wore itself out chasing the late Pancho Villa, Lieut. Koger was sent to Columbus to fix up the carburetors on the Curtiss "R" engines for the Government, and got his first flying there. Later he returned to El Paso and made many reconnaissance trips into Mexico through Juarez. Just how far past Smith's bar in Juarez he reconnoitered, he does not state.

After the Mexican war was over, and Villa had got done laughing, Koger got out of the Engineers and took the Army course in flying at the Curtiss School at Newport News. Among the old-timers there then was Captain Baldwin of balloon fame, Captain Cecil Sellers, Captain St. Clair Streett, and the late Colonel J. Hambleton. Tiring of Army life, after a disagreement with a Commanding Officer (who as a rule are very hard people to get along with) Koger transferred to the Navy, which brightened up at once with his coming. The Army has never forgiven him for this, and has never been quite the same since.

Koger took all the courses the Navy had to offer, including the M.I.T. course under Professor Warner. Once a man has taken that course he is considered to be completely full of aeronautical lore, and no further information may be imparted to him. There isn't room for it. Koger was so full of figures, curves, ratios, lifting surfaces, dihedrals and other complicated stuff that the only thing to do with him was to chuck him into the Bureau of Engineering, the floor of which is specially reinforced to bear such weight. He spent three years letting this stuff evaporate, by which time he had lost enough tonnage to serve on the Navy trial board. But even at that, a Martin Bomber dropped with him.

In January, 1921, he was considered sufficiently deflated of Professor Warner's information to place him on the inactive list. He went west with Donald Douglas, designer of the Martin Bomber—even if Glenn won't admit it—and helped to establish the Davis-Douglas Co. He donated even his shirt to that enterprise, which had hard going for a time. After this trip to the cleaner's, he went back to the automobile business, where he solved the problem of what to do with old used cars and safety razor blades. His solution was: Melt the old used cars up into safety razor blades, and sell them; and melt the old safety razor blades up into new cars, and sell them. This solution has never been improved upon.

* * *

P. B. McCarthy

PILOT P. B. McCARTHY got off to a bad start on a farm in Cecil, Ohio, May 25, 1899, as he soon discovered. Of course he didn't realize at that early age that there were more farmers raising things to eat than there were customers to eat those things. All he knew as a boy was that it was mighty tiresome following a horse down a field. The crows and hawks, he decided, had all the best of it, sailing along up there out of the dirt. So at the age of 20 he tried to make the Army believe that it would get along better if he was part of it, in an airplane. He had been part of it since he was 18 with the A. E. F., but the only military equipment they had handed him was a rifle, a bayonet, a shovel and a potato peeler. He had a shovel, so the only souvenir Mac brought back from the war was the potato peeler; he took that to remind him of the tears he'd shed peeling onions.

Well, the Army, it seems, had enough guys that didn't want to work, so there wasn't a vacancy in a single Jenny. So poor McCarthy went back to the trade of machinist, that he'd worked at off and on during his years on the farm. He'd learned the machinist trade by taking the farm machinery apart; he used to get some of it back together again, too, but not all. In fact, the neighbors used to go to his farm for spare parts for their tractors. Mac always had a lot of parts left over when he rebuilt an engine. You could nearly always get a wrist pin or a connecting rod, or even a crankshaft if you wanted it. In the picture he's holding a small piece of an engine, a nut or pin or something, and wondering whether he got it out of the Ford or the Chevrolet—he isn't sure which, as neither one will run.

He writes: "I have been a machinist all my life and felt like a slave to machinery"—I know how you feel, Mac, I feel just the same about this typewriter. "The only place was the air, clear away from the world, so I learned to fly." I don't know that flying gets you clear away from the world; you always have to land again. Mac learned to fly a year and a half ago. He worked until midnight at his trade, as well as daytime, to pay his tuition. When he had 50 hours he went flying for the Monocoupe distributor at San Antonio, demonstrating and selling planes, ferrying them from the factory. Then he flew Ford trimotors for Southwest Air Fast Express, and was put in charge of Division One. That's what I call pretty good for an old farm boy that nobody ever gave much of a hand to.

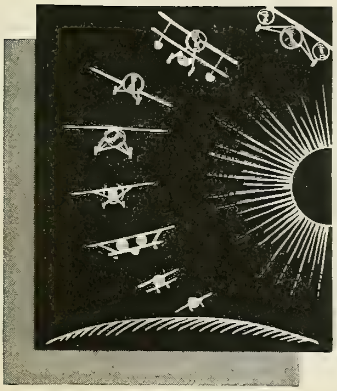
* * *

Bobbie Trout

ON Jan. 7, 1906, Mrs. Lola Trout presented her husband, George Trout, with a very small troutling named Evelyn. This happy event occurred in Greenup, Ill. The little Trout grew and thrived, getting into the swim of things, and for the first few years acted as a normal female Trout named Evelyn might reasonably be expected to act. However, even in school, it was noticed that the name of Evelyn was hardly appropriate for a young Trout of Evelyn's proclivities. She was far more interested in mechanics than in dolls. In manual training school she much preferred to build tables and chairs for other girls' dolls rather than to play with her own. And when she had her hair bobbed, which she had at an early age, it was apparent, not only to the parent Trouts but to everyone else, that the name of Evelyn should be changed to Bobbie. And Bobbie Trout she remains to this day.

It was apparent to Bobbie that she'd save time with an airplane, so in 1922 she took a flight with Tommy Thomas at the old Rogers Airport in Los Angeles. Then she took a course with Burdette Fuller, graduating April 30, 1928. In June she received her commercial license, and became an employee of the R. O. Bone Company of Inglewood, Calif., demonstrating Golden Eagle planes, in which she made the first notable endurance flight for women. She was one of the first women to receive a transport license, and the very first Trout to take to the air.

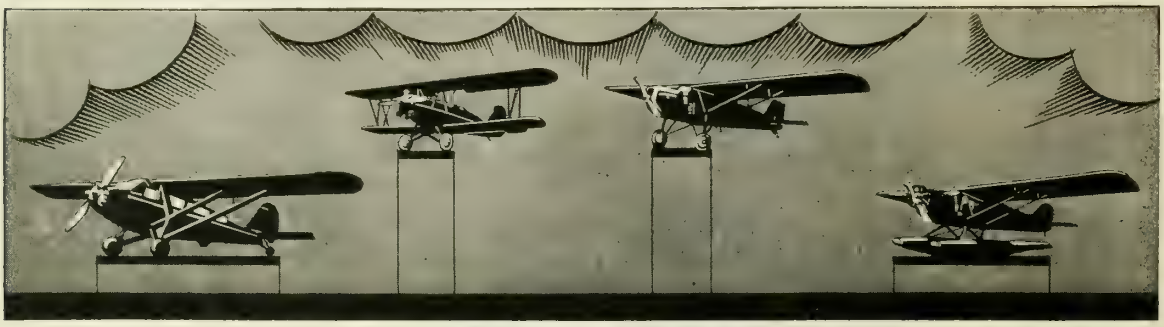
1930



IT SEEMS appropriate at this time to define the present position of the Curtiss-Wright Sales Corporation and to outline its plans for the future. ⁓ The Corporation is now the sole outlet for the entire commercial aircraft production of these outstanding manufacturers in the Curtiss-Wright group. ⁓ *Travel Air Company*, makers of one out of every four commercial planes in the United States, builders of 17 types of planes and of the spectacular Mystery ship which outflew every competitive speed plane at the Cleveland Show. ⁓ *Curtiss-Robertson Airplane Manufacturing Company*, with its Curtiss-Robin three place cabin monoplane, probably the most widely known moderate priced plane for all-round use. ⁓ *Curtiss Aeroplane and Motor Company*, pioneer builders of airplanes and engines, whose Fledgeling training plane was chosen in open competition by the Navy and is now widely used by commercial flying schools, whose giant twin-motored Condor is the latest luxury in transcontinental

CURTISS
SALES

transport ships. ~ *Moth Aircraft Corporation*, whose DH Moth biplane has a brilliant record of over 10,000,000 miles in the air. Easily housed in a one-car garage, the Moth is destined to be the most popular light plane. ~ *Loening Aeronautical Engineering Corporation*, the world's leading producer of amphibian planes, creators of special types for military, naval and coast guard use, makers of the Air Yacht for transport service and of the Commuter, the luxurious craft now favored by wealthy sportsmen pilots. ~ *Keystone Aircraft Corporation*, long noted as producers of large multi-motored aircraft, builders of famous



To build the best Airplanes in their class, regardless of cost, will continue to be the policy of the Travel Air Company. This policy, the wisdom of which has been thoroughly proven, has brought the company from a modest beginning to a position of leadership in the aircraft industry in six short years. Our plant and organization at Wichita, now ready for production on an increased scale, will continue to serve owners and operators. With a distributor personnel fortified by able additions and with the country-wide facilities of Curtiss-Wright service stations and dealers now made available to us, Travel Air's position will be further strengthened.

TRAVEL
AIR
COMPANY
■
■
■
WICHITA
KANSAS

Walter H Beech
PRESIDENT

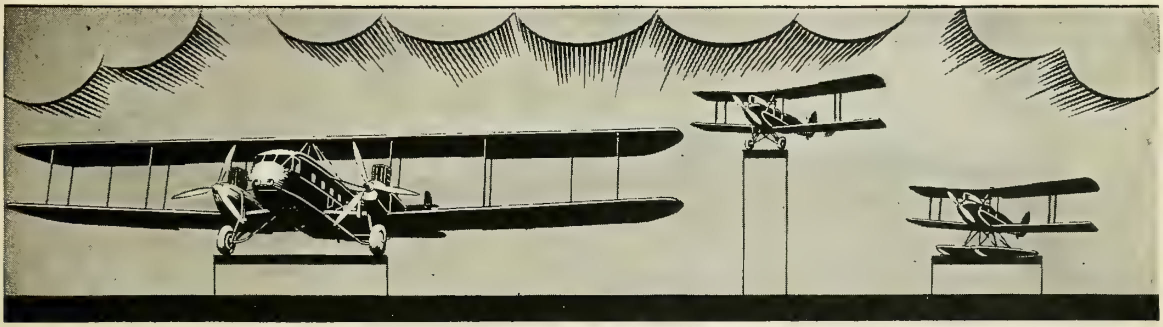
The Curtiss-Robin was widely accepted within a short time because it gives the purchaser more airplane per dollar than any plane in its class. The winning of the world's endurance record and its numerous other achievements proved the basic soundness of the type. Now, with the same fine up-to-date plant that made the large scale production of the Robin possible, we confidently look for even greater results in 1930. And by having our planes and parts distributed and serviced by the Curtiss-Wright group, every ship will carry with it a service guarantee not approached by any competitive line.

CURTISS-
ROBERTSON
AIRPLANE
MANUFACTURING
COMPANY
■
ST. LOUIS
MISSOURI

Wm B Robertson
PRESIDENT

WRIGHT
CORP.

army bombers and of the Patrician, tri-motored 18-passenger transport. ∾ These Companies, each pre-eminent in its field, will retain their own identities as manufacturing units, will continue under the same able leadership which has brought them to the forefront in the industry. Through the unifying control of the Curtiss-Wright Corporation, their position will be strengthened by the coordination of development work, the centralizing of raw material purchases, the pooling of technical information and research data, the elimination of duplication and waste. ∾ Backing their program of development is the largest



I am glad that the products of the Curtiss Aeroplane and Motor Company are now to be carried into the field of commercial aviation by the Curtiss-Wright Sales Corporation. We hope to serve the public through this new organization as faithfully as we have served the Army and Navy, where for twenty years Curtiss planes and motors have always done their bit.

CURTISS
AEROPLANE
AND MOTOR
COMPANY
■
■
GARDEN CITY
NEW YORK

VICE-PRESIDENT

The Moth Aircraft Corporation has become the light plane division of Curtiss-Wright. We will carry on with all distributors and dealers who have handled our products in the past. To these dealers and their customers, will be available over one hundred Curtiss-Wright service stations throughout the country, in addition to existing Moth stations in the United States, Canada and foreign countries.

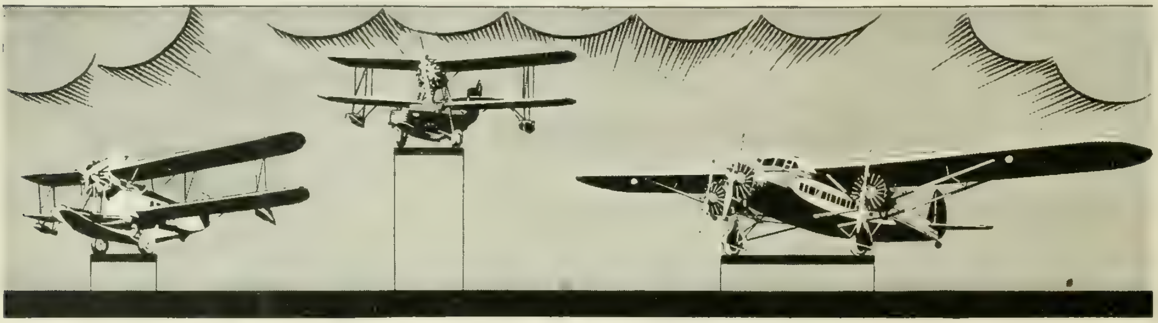
There will be no change in policy, but all contracts for sales will be made through the Curtiss-Wright Sales Corporation, who will represent us throughout the world. I believe that this set-up offers to dealers, as well as Moth owners, a service and an economy which cannot be approached by any other light airplane producer in the United States.

MOTH
AIRCRAFT
CORPORATION
■
■
■
LOWELL
MASS.

PRESIDENT

CURTISS
SALES

aviation enterprise in the world with a capital amounting to one-third the total aviation investment of the country. ~ Backing their products is a nation-wide service organization including *Curtiss-Wright Flying Service, Inc.*, which operates 40 flying schools capable of training 10,000 pilots a year. ~ With an array of aircraft covering the entire range of type, style and price, the distributing organization of Curtiss-Wright Sales Corporation faces a world ready and anxious to fly. Aviation activities are now more than doubling every year. Airports, airlines, flying schools, aviation country clubs, are being organized



Keystone-Loening Amphibians, originally developed from the military Loening planes, have taken their place as machines of greatest reliability for both private and transport use, as evidenced by their universal acceptance during 1929. To meet the growing demand for these planes, they will hereafter be built at the Bristol factory of the Keystone Aircraft Corporation, where augmented facilities will permit large production on an economical scale. The distribution and servicing of Keystone-Loening Amphibians by the extensive Curtiss-Wright organization will increase their practical utility to transport operators and private owners.

LOENING
AERONAUTICAL
ENGINEERING
CORPORATION
■
■
NEW YORK
CITY

A P Loening VICE-PRESIDENT

With an established reputation as leading producers of military aircraft and multi-motored transports, Keystone's large facilities have now been practically doubled to permit the production of commercial planes. With a highly efficient organization, we are now producing various types, including the well known Keystone-Loening Amphibians, training planes, and a series of Patrician air liners in quantities that will result in manufacturing economies. Distribution will be handled through the nation-wide sales and service organizations of the Curtiss-Wright Corporation, with obvious advantages to users of our products.

KEYSTONE
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on all sides. Private planes, licensed pilots, air-traveling passengers are rapidly increasing in numbers from month to month. The time for organized sales and service has arrived. Curtiss-Wright Sales Corporation invites all interested in the new era of aviation to meet the executives of the Corporation at the St. Louis Aviation Show, February 15th to 23rd, to inspect its complete line of aircraft exhibited there and to discuss mutually profitable plans for the future. ∾ Complete details regarding the entire line of Curtiss-Wright Airplanes will be gladly supplied from the offices of this Corporation.

WALTER H. BEECH, PRESIDENT

CURTISS-WRIGHT
SALES CORPORATION
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AIRPORT AND AIRWAY

News of airlines, airports, and airways; radio, lighting and other auxiliary services

By

Kent Sagendorph

The Long-Awaited Fare Reductions

THE biggest news of the month in airport and airway circles was the drastic cuts in passenger fares as announced by eight of the leading airlines of the country. Interested observers of this class of traffic have prophesied and predicted for many months, and every one knew that this happy state of affairs would arrive sooner or later. It appears that when one line took the lead and announced a worthwhile fare cut, the others fell into line and did likewise, really accomplishing a general decrease in the average cost of an airplane journey.

Air travel in every section of the country is less expensive now than it was a few weeks ago. Immediately after the new rates went into effect the volume of traffic on all the lines concerned jumped rapidly. Investigation of the new condition shows that the lines are carrying the same persons and the same classes of traffic they formerly carried—*plus* a few new classes which were hitherto unavailable. The situation appears mutually beneficial. Operators, facing a slack winter season, were gratified to see their ships carry capacity loads. Passengers, feeling that air travel was a luxury for the very wealthy, were gratified to learn that the new prices were such that air travel became possible for the general public.

Two instances of the fare reduction resulting in new clientele are given herewith. In California the state controller of finances notified all employees of the state that he would approve expense vouchers for air travel. The state government had refused this privilege before the fare reduction because of the expense. Now, any state employee traveling on state business may (and doubtless will) use the airlines in preference to other modes of travel. Thus a new class of traffic came into being and brought thousands of new potential customers to California air transportation companies.

In the Middle West, the newly-merged Transcontinental Air Transport-Maddux system created the aerial flag stop. Now a passenger in those cities which were accorded the privilege may call the T. A. T. representative on the phone and ask the plane to stop for him. Notified by radio while in flight, the pilot drops down on the local airport and picks up the passenger. This addition to the service, by permitting the decrease in fares, is certain to result in a new class of business for T. A. T.-Maddux entirely apart from their regular transcontinental clientele.

The eight airlines which reduced fares are: Western Air Express, Standard Airlines, Universal Air Lines, T. A. T.-Maddux, Colonial Air Transport, Canadian Colonial Airways, Colonial Western Airline, and Curtiss-Wright Flying Service.

Western Air Express reduced fares on two of its most prominent routes—Los Angeles-San Francisco and Los Angeles-Kansas City. The $33 fare to the California capital was reduced to $21.50, and the rate of $175 to Kansas City was reduced to $140. Fokker trimotors are used on both lines.

Standard Airlines placed a blanket ten per cent reduction on all its fares on all its lines; from Los Angeles to El Paso via Tucson and Phoenix. One-way to El Paso is now $69.75; round trip $125.55. Fokker trimotors used.

Universal Air Lines made an excursion rate from Cleveland to Chicago and from Chicago to St. Louis, as well as Chicago to Kansas City. The rates apply Saturday and Sunday and approximate a reduction of $15 to $20 below regular fare. Ford and Fokker trimotors used.

T. A. T.-Maddux reduced the transcontinental fare from $338.10 to $267.43, a reduction of approximately twenty per cent. Rates between points on the route were reduced proportionately. Ford trimotors and Curtiss Condors are used.

Colonial Air Transport reduced the New York-Boston fare from $33.85 to $27.88, and reduced the round trip fare to $52.97. Ford trimotors used. Colonial Western cut the Buffalo-Toronto fare to $12.50. Sikorsky amphibions used. Canadian Colonial reduced the New York-Montreal rate to $33.40, a reduction of $16.60. Fairchild 71s used.

Curtiss-Wright Flying Service issued a statement that it was reducing the fare on non-scheduled charter service to nine cents per mile *per passenger*. The equipment offered at this price is a Wright J-6 Travel Air cabin plane holding five passengers, and the rate applies only when there is a full load for the return trip. Even this is a reduction of twenty-five per cent over their former tariff for charter flights. There is only one example of an increased expense to the passenger. Northwest Airlines, operating the Chicago-Minneapolis line, reports that its rate of $30 is the lowest in the country per mile, and that in order to keep it so they have decided to eliminate the ground services hitherto offered without extra charge. Now the passenger must pay his own taxi fare to and from the airport.

Indeed, all the lines which reduced fares are skeptical about their ability to maintain them at this low level. All claim that the new rates are "tentative," "temporary" or "for a limited period." We may see the pendulum swing in the opposite direction if sufficient patronage is not forthcoming to support the theory that passengers appreciate a fare reduction. However, if first indications are correct, there will be a great increase in passenger traffic on those lines which have thus shown their willingness to coöperate, and a new era of prosperity for passenger-carrying airlines is here.

States Which Do Not Regulate Aircraft

REPLYING to the letters of Robert O'Brien, Bryn Athyn, Pa., Alaric Walton, New York City, and others, we assure readers of the Airport and Airway section that the small paragraph published in the November issue on this subject was correct, and that there are nine states which do not regulate aircraft in any way whatever. Others have state laws requiring either Federal licenses or state licenses for pilots and aircraft. The nine which do not are given herewith: Alabama, Georgia, Ken-

(*Continued on next page*)

Courtesy Lockheed Aircraft Corp.

Aerial view of the new United Aircraft field nearing completion at Burbank, Calif., near Los Angeles

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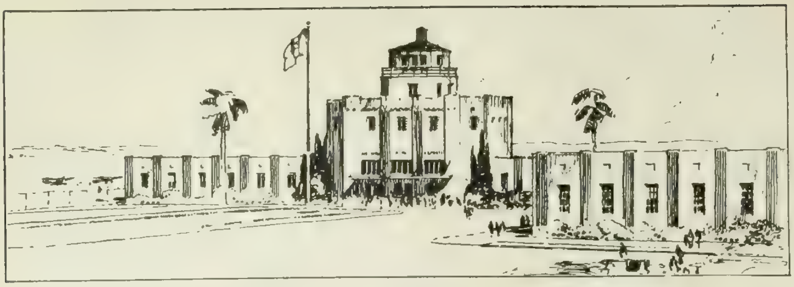


Sketch of the passenger station at the Western Air Express airport, Los Angeles

(Continued from preceding page)

tucky, Louisiana, Nevada, Oklahoma, South Carolina, Tennessee, and Utah.

The Federal requirements for aircraft and pilot licenses have been explained in detail and are quite generally known. Of the states other than the twenty which require Federal licenses, six require either Federal or state licenses and six others require state licenses. There is no essential difference in the requirements for state licenses and Federal licenses. Most of the states which license aircraft and pilots have adopted a uniform law which parallels the requirements of the Department of Commerce.

Air Markers on Railroad Road Beds?

WALTER E. LEES, aeronautic engineer with the Packard Motor Car Company, suggests that railroads be induced to paint the name of the road at intervals between the rails on the roadbeds of their lines. Such markers, it was stated, would constitute excellent aids to direction-finding for pilots who have maps which show the names and lines of the various railroads.

AIRPORT AND AIRWAY DEVELOPMENTS

Small Airports May Boost Rates

UTICA, New York, is the first of the Eastern cities at which revision of storage and service rates at municipal airports may be expected. A solution may be expected from the deliberations of the New York State Mayors' conference, which is studying the whole subject of airport rates from the state's angle, inasmuch as Utica is not alone in the small revenue received from its airport.

The conference considered the matter of refreshment and other concessions at the airports as a source of revenue, as well as operating the airport within the amount provided in the budget. Mayor Charles G. Hanna, of Syracuse, is chairman of the conference which is considering the problem. New schedules of charges for the use of airport facilities, with general regulation throughout the state, is expected.

New Features at Western Air Express Los Angeles Terminal

FEATURES unique in airport construction are revealed in plans for passenger facilities at the new airport of Western Air Express on Valley Boulevard, Los Angeles, as announced by A. C. Zimmerman and E. M. Edelman, associate architects. The field is now in daily use, although not completed.

The architect's plans call for the building of two garages which will be devoted to the storage of automobiles belonging to passengers using the various W. A. E. lines, it was stated. The approach to the passenger station will be so arranged that 300 automobiles may be parked there simultaneously.

The main waiting room, on the first floor of the passenger station, will have a club atmosphere. The room will be fifty by fifty feet, and will contain facilities for obtaining tickets, the handling of baggage, telephone and telegraph services. Adjoining will be comfortable rest rooms for men and women. One wing will be devoted to the handling of air mail and express. The other will contain a lunch counter. At the rear of the building, facing the landing area, will be a concourse which passengers may use entering and leaving the field.

Airport Bulletins Issued by the Department of Commerce

FOLLOWING is a list of new and revised airport bulletins issued recently by the Aeronautics Branch, Department of Commerce:

Bulletin No.	*Airport*
682	Baker, Oregon
777	Palm Springs, California
778	Arlington, Oregon
779	Hemlock, New York
780	Cherokee, Wyoming
781	Otis, Colorado
782	Walcott, Wyoming
783	Burns, Wyoming
784	Corvallis, Oregon
785	Portage, Wisconsin
786	Medicine Bow, Wyoming
787	Columbus, Ohio
788	Rock River, Wyoming
789	Jasper, Texas
790	Ritzville, Washington
791	Wisconsin Rapids, Wisconsin
792	Bellingham, Washington
793	Bitter Creek, Wyoming
796	Yakima, Washington
798	Cedar Falls, Iowa
799	Enid, Oklahoma
801	Santa Rosa, California

Goodyear to Establish New Airport

WORD has lately reached this department that the Goodyear-Zeppelin Corporation has decided to establish a new airport in Ohio between Akron and Cleveland, about twenty-three miles north of Akron and twenty-three miles from Cleveland. It will comprise 1,250 acres, with 300 acres additional in reserve. It will be named Issudun Field as a memorial to the famous Issudun Airdrome in France, where so many American war-time pilots received their training.

The field will be under the direction of Major Thomas P. Lanphier, war-time commander of the original Issudun field, now connected with the Goodyear-Zeppelin Corporation. It was selected in 1924 by Capt. Ernst Lehmann, first officer of the *Graf Zeppelin,* then in America as an official in the Goodyear organization. It will be used as a base for dirigible operations.

Why Not Gas for Airport Beacons?

WE are in receipt of a welcome letter from Harry Park, Los Angeles, California, in which he refers to the article in the September issue of AERO DIGEST entitled "Flaming Gas Beacon?" by Earle Ovington. This referred to the city of Long Beach, Calif., and cited the difficulty of distinguishing the airport lights from the thousands of other lights visible in the town; a remedy for which was suggested in the use of natural gas in a flaming beacon which would be readily distinguishable.

Mr. Park suggests that this idea could be carried still further and the use of natural gas could be employed in a whole row of flaming beacons, at about ten-foot intervals for the first 200 or 300 feet around the edges of the field. He states that the system would have the added advantage of rendering the whole field practically fog free, since the heated air would have a tendency to be less saturated with moisture. The flames should reach from three to five feet, advocates Mr. Park, and should be mounted on twenty-foot vertical sections of gas pipe.

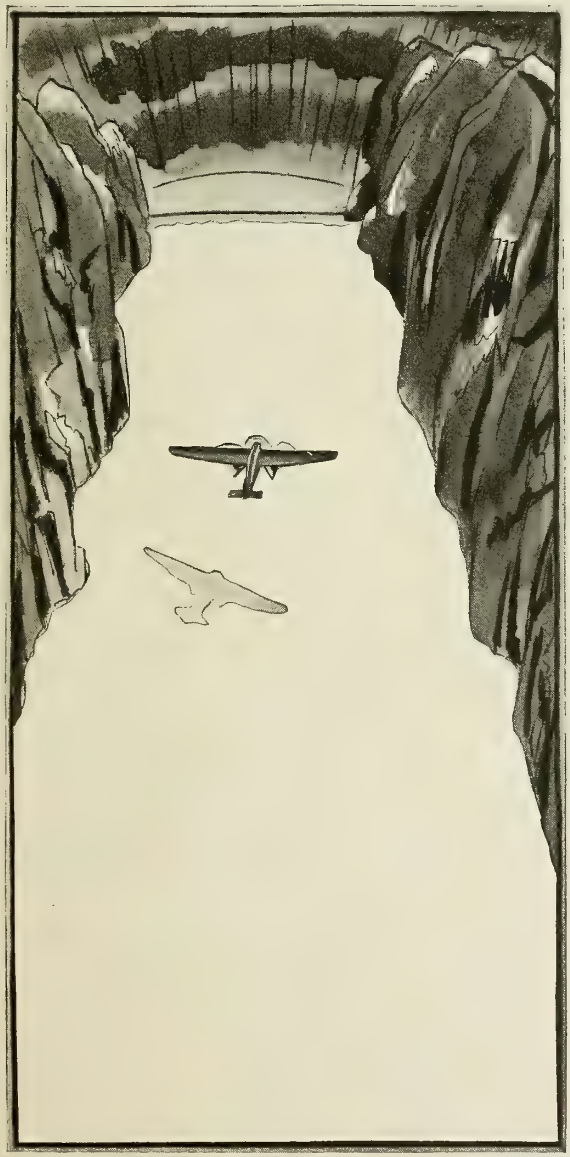
He has taken as an example the experience of the citrus growers of his state who have long used smudge pots on the windward side of their orchards to prevent frost on the fruit. By placing a row of these beacons on the windward side of an airport the prevailing wind would cause the heated air to displace the cold air and fog on the field, and would have two distinct advantages: (a) no chance of confusing the airport lights with any other lights, (b) practically no expense entailed other than the laying of the pipe. In oil districts and other areas in which natural gas is available it is very inexpensive, and at many oil fields it is wasted entirely because of lack of proper use for it.

This suggestion appears to be practical, timely and novel. It is a known fact that at hundreds of oil-producing centers, natural gas is either exhausted to the atmosphere or else consumed in a flame in order to prevent its odorizing the neighborhood. There is a field just north of Tampico, Mexico, at which four enormous jets of flame belch fire continuously, day and night, in order to burn the wasted gas. Tampico has an airport and it has an indifferent lighting system. The idea is applicable to Long Beach, Bakersfield, and other points in California, Texas, Oklahoma, Pennsylvania and kindred oil-producing states.

Many thanks to Early Bird Harry Park for a welcome suggestion, as it is herewith

(Continued on next page)

FIRST THE NORTH POLE THEN THE SOUTH!



LACONICALLY, out of the snow and cold, this story of Wright engines—one "Cyclone" and two "Whirlwinds"—is told by Commander Byrd, who now has flown both Poles behind Wright power.

The plane "Floyd Bennett" took the air at 3:30 P. M. November 28th. "*Motors fine.*" At 5:30 they were flying well and nearing the great crevasses. "*Motors fine.*"

At 7:00 they were nearing Gould's geological party struggling along the trail beneath. "*Motors fine.*" By midnight they had covered seven hundred miles and the Pole lay ninety miles beyond. "*Motors fine.*"

At 1:00 Byrd's calculations indicated they had reached the Pole and were flying high for observation. Plane and crew in good shape. "*Motors fine.*" They crossed the Pole . . . flew beyond it . . . around it . . . and then turned North. "*Motors fine.*"

At 4:33 they landed at the Mountain Supply Depot, re-fueled and were on their way again at 6:00. "*Motors fine.*" At 8:00 they crossed again the great crevasses, flying well. "*Motors fine.*" At 10:10 Balchen landed at Little America after flying 1600 miles in 17 hours and June signed off. "*Motors fine.*"

WRIGHT

AERONAUTICAL CORPORATION
PATERSON, NEW JERSEY

Night view of the airport at Montgomery, Ala., showing the building illumination effected by lighting equipment recently installed.

(*Continued from preceding page*)

forwarded to the readers of this section for consideration and comment.

Thompson Adds Another Base

THE fourth link in the Thompson Aeronautical Corporation's chain of airplane service and repair stations was officially opened at the Pontiac, Michigan, municipal airport a few weeks ago. It was erected at a cost of $110,000. The main building, or hangar, has a clear floor area 120 feet square. In addition to the storage space there is an administration building two stories in height and measuring 40 by 120 feet. There are also separate structures housing a boiler room, test room, welding room, dope room and engine overhaul and repair department.

St. Louis Municipal Airport to Be Further Developed

FOLLOWING the installation of various types of test runways at the St. Louis Municipal Airport, B. Russell Shaw Co., Inc., airport engineers of the Missouri city, are now preparing a comprehensive plan for the entire development of the port, including a double runway for each wind direction as well as a budget for the expenditure of the balance of the $2,000,000 bond issue, as directed by the Airport Commission for the City of St. Louis.

New Port of Entry at Ajo, Arizona

ANOTHER interesting piece of correspondence was a letter in what looks like blank verse, received from our friend "Wind Sock," alias Bob Hausler, of the Arizona community. He advised us that the airport at Ajo has been designated as an official port of entry, enclosed a blue print of the new field, and stated that it would be dedicated next February. All persons entering the United States in the vicinity of Ajo are hereby informed that a customs man will be on duty there shortly.

Larger Airport Floodlights Available

THE Pyle-National Company of Chicago is now furnishing its standard type floodlight equipment to burn a new 1,500-watt, thirty-two-volt lamp. With this, the projection range is increased fifty per cent over the range of the 110-volt lamp. A large increase in the apparent beam candlepower has been obtained.

Bellanca Building New Hangar

A NEW brick and steel hangar is being constructed by Bellanca Aircraft Corporation, Newcastle, Delaware, on the Bellanca-Wilmington Airport. This new building, which adjoins the Bellanca factory, is 120 by 100 feet. Brick and steel construction, with special roof and floor equipment, reduce the fire hazard. All-steel round-the-corner type of doors are used, giving an opening of ninety-five feet seven inches. A concrete apron, the full width of the doorway, will lead directly to the field.

The company is also erecting an extension to its office building.

Roof Sign at Oneonta, New York

PILOTS flying between Albany and Buffalo are advised that there is a new roof sign at Oneonta, N. Y., at the head of Lake Oneonta. Built by the Briggs Lumber Company and installed on the roof of their warehouse, it reads: "Briggs Lumber, Oneonta, N. Y." and is visible at altitudes of 5,000 feet and above.

Rates for Storage at Port Columbus

PORT COLUMBUS, Columbus, Ohio, has announced rates for storage of aircraft at the field hangars as follows:

	Month	*Day*
Wing spread 36 feet..........	$30	$2.00
Wing spread 37 to 59 feet.....	35	2.50
Wing spread 51 to 60 feet.....	60	3.50
Wing spread above 61 feet....	90	5.00

Aviators using the field for carrying passengers for hire or reward, carrying mail, chartering planes for special trips, maintaining regular plane service for sale and demonstration purposes, are charged the following rates:

	Year	*Month*	*Day*
Two-passenger planes.....	$250	$35	$15
Four-passenger planes.....	350	50	..
Six-passenger planes......	400	65	30
Over six-passenger planes.	500	80	40

Aviators taking passengers up for sightseeing or similar purposes, using the port as a base, may be charged ten per cent of their gross income, plus storage charges. For fleet operation, or where more than one plane is being used by the same person or company in air commerce, the rate is twenty per cent lower on storage and commercial operation schedules.

The ordinance requires operators not regularly based at the port to register daily at the administration building and pay their fees in advance. Evidence of the airworthiness of the craft must be given, and the pilot must produce his license.

Rates for lighting equipment, floodlights, locker rental, tool box rental, bunks, and mechanic's services are also fixed by the ordinance.

AIR MAIL NOTES

Air Mail Situation Settlement Delayed

INDICATIONS are that the settlement of the air mail situation concerning rates will not be effected for some time. Such was the consensus of opinion among contractors who were on the "battle-ground" in Washington for the past several weeks. Postmaster General Brown has relieved contractors of the necessity of camping in Washington, and has informed them that they might as well return to their respective airports with the knowledge that they will be sent for when another meeting is called to study the rate situation.

It is believed that the Post Office Department will delve more deeply into marine mail matters before taking up the air mail considerations. The marine cases have been under observation since last July, it is stated, and their disposition may take precedence over the air mail contract decision.

The Post Office Department meeting will turn to a further discussion of the proposed southwestern route at its earliest opportunity.

Post Office Department Denies Acceptance of Proposal

ASSISTANT Postmaster General W. Irving Glover stated that the Post Office Department has not accepted any proposal of any airline operator for an airmail service between New York and Los Angeles.

Rumors were current on certain points in the lines under consideration that the route for the proposed direct line had been decided upon. That, said Mr. Glover with firmness, is not the case.

Two proposals have already reached the Department concerning this route, of which nothing official has been heard. One came from Mr. Erle P. Halliburton's Southwest Air Fast Express, Inc., and the other was submitted by Southern Skylines, Inc., of which William G. MacAdoo, former Secretary of the Treasury, is president. Both gave statistics covering the operation of a direct air mail line from New York to Los Angeles, via the Southwestern states.

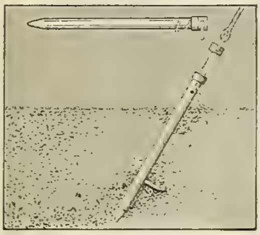
Adams Pick-up Demonstrated at Teterboro Airport

THE first New Standard mail plane equipped with the Adams Pick-up was flown from Teterboro Airport on Tuesday,

(*Continued on next page*)

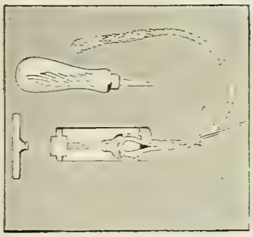
Specialties from Specialists

As specialists in supplying the miscellaneous needs of America's most rapidly changing Industry and through their close contact with every branch of it, Air Associates are often in a position to foresee needs and to supply them first. For instance, Air Associates were first to publish a complete mail order catalog of aeronautical supplies and equipment, first to establish a completely organized aeronautical jobbing service and first to supply many devices of special purpose, simple in design and reasonable in price, such as the four items illustrated and described below.



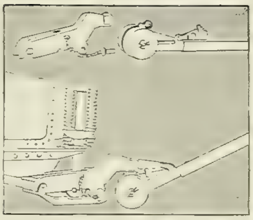
A. A. HOLD DOWN STAKE

The ingenious barb on this stake makes loosening and pulling out impossible. Yet with a tap of the hammer on the top of the stake, you can close up the barb and pull the stake out easily. The stake is light, compact and sturdy, thoroughly rustproofed and easy to drive in frozen ground. List $12.00



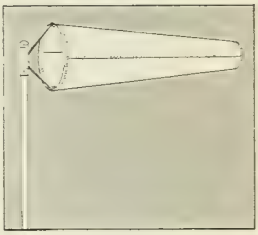
A. A. SPLICING CLAMP

U. S. Department of Commerce regulations now make it necessary to splice all extra-flexible control cables. And here is an outfit that makes it possible to do the job easily after the cable is in place on the airplane. It may be clamped to any part of the ship, held in the hand or fastened in a vise. Fits all sizes of cables and eyes and is light and compact. The marlin spike is specially designed for the purpose. List $5.00 Spike, 60c extra.



A. A. SIKORSKY DOLLY

It takes six men to move a Sikorsky in and out of the hangar. With this dolly which is lighter and smaller than other dollies that could be used to move a Sikorsky, one man can do the job easily. Approved by Sikorsky Aviation Corp. Just fits the tail skid. Made in two pieces and weighs only 25 lbs. Perfect leverage —when in place, there is no weight on the handle. List $190



A. A. WIND CONE

A wind cone of ample size and high visibility. It measures 8 ft. in length and the diameter at the large end is 20 inches. Made of durable sunproof material, orange-yellow in color. Easy to set up. Fits standard 1¼" pipe. The swiveling bracket is strong and rigid and is affected by the slightest breeze. List $15.00

Recognized jobbers and dealers are invited to write for discounts

Winter Flying Clothes

Winter flying suit of waterproof buckskin cloth lined throughout with long wool sheepskin. Big fur collar, regulation type $60

Moccasins of stout chocolate Retan, lined with sheepskin. 4 Buckles. Specify size of shoes worn when ordering $13.75

Zipper Wind Breakers. Highest grade of leather, beautifully lined. Two pockets. No. 1929-S Soft Brown Leather $24. No. 1929-B Black Horsehide $22

Winter Helmets. Wind-proof. Fits snugly against the cheeks. No. 350 in chocolate brown glove leather with beaverized sheepskin lining . . . $5.00

Air Associates offer specialized aeronautical service at their two splendidly equipped stations at Roosevelt Field, New York, and the Municipal Airport, Chicago. They are authorized sales and service representatives for Bendix, Wright and other key manufacturers in the Industry. And their great catalog illustrates and describes a complete assortment of carefully tested aviation supplies and equipment.

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.... $........................
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Address ....
City .... *State* ....
P. S.—Don't forget to include a copy of your new catalog

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and GARDEN CITY, N. Y.

(*Continued from preceding page*)

December 3rd, to be put into service by Clifford Ball, Inc., operating the Cleveland-Pittsburgh line.

Following tests with the mail pick-up device on other planes, Clifford Ball ordered the special installation on his fifth New Standard plane. For some time the device has been demonstrated at the Teterboro field.

Mail Poundage Lighter in November

THERE were 623,161 pounds of mail transported by air mail for the month of November, 1929, as against 701,625 pounds for October, according to figures made public recently by Postmaster General Brown. This shows a decrease of 78,464 pounds from the October total. There were, however, but twenty-five business days in November, as against twenty-seven business days for October.

The daily average for November was 20,772 pounds, whereas for October there was a daily average of 22,663 pounds.

World's Longest Mail Flight Completed

THE longest air mail haul in the history of aviation was ended early this month with the arrival in New York of the first air mail from Montevideo, Uruguay. More than 8,000 miles of airlines were covered by the mail in eleven days, which beat the steamer time by about six days.

The mail left the Uruguay capital in planes at the Pan American-Grace line, which took it to Panama, whence it was conveyed in the planes of the Pan American line to Miami, and relayed via Pitcairn Aviation to New York. It is interesting to observe that the lines of the Pan American-Grace Airways run from Panama down the west coast of South America and cross the South American continent and the high Andes range before arriving at Montevideo.

REGULATING AIR TRAVEL

Government Invites Suggestions on Traffic Control

IN an endeavor to bring about uniformity in the matter of air traffic control, the Department of Commerce has organized a committee on standard signal systems for airports which is now inviting suggestions from airport managers and engineers, aircraft operators, and all others interested in the subject. This committee includes representatives of the Aeronautical Chamber of Commerce, Bureau of Aeronautics for the Navy, the Army Air Corps, the National Advisory Committee for Aeronautics, the National Bureau of Standards and the Aeronautics Branch of the Department of Commerce.

The committee now requests that it be furnished with descriptions of the systems of air traffic control in use or projected at individual airports, and is inviting suggestions from them. In general, systems of traffic control are grouped under three headings: oral, visual and radio. The system ultimately adopted by major air terminals will be, doubtless, a combination of all types of present equipment.

"Airports are the bottle-necks of air transport," said Col. Harry H. Blee, director of the Department's Aeronautic Development Service. "As time goes on and the aerial transportation of passengers, mail and express increases, an accurate control of this traffic will be a basic necessity. It is felt, therefore, that the studies about to be undertaken are of considerable importance to the advancement of the industry."

Minnesota Air Law Now Functioning

MINNESOTA'S new statute requiring the licensing of planes and pilots is now in effect, temporarily in connection with the automobile licensing department. Aircraft and pilots must obtain licenses from the secretary of state under the statute, which provides that no civil aircraft shall be flown in air commerce in the state unless licensed, either by the state or Federal governments.

Fees will be ten dollars for the examination of pilot or plane with an additional two dollars for the issuance of the certificate of approval for aircraft. Rules and regulations follow those of the Department of Commerce.

Airports May Be Liable for Damage Claims

THE necessity of legislation to establish the rights of citizens to damages resulting from airplane accidents was discussed recently by George B. Logan, chairman, legislative committee of the St. Louis Air Board. Mr. Logan pronounced an opinion to the effect that a municipal airport would undoubtedly be liable for damages obtained against it by persons injured in one of its own aircraft. He pointed out that it was extremely doubtful whether the courts would accept a plea of "an Act of God" in aviation mishaps and accidents because of the fact that airplanes, because of their speed, may avoid storms and other natural phenomena. The Missouri General Assembly in its 1929 session enacted a series of laws defining aviation, setting forth the rights of citizens in the event of damages and prescribing rules governing flying in general.

Michigan State Board in Charge of Aviation

THE Michigan State Board of Aeronautics, the first of its kind in the nation, has a working capital of $10,000 and is now functioning under the law passed by the 1929 legislative session. Proceeds from the extra gasoline tax have added $15,000 for the board, which will supervise the construction and operation of airports, fields and flying schools.

With Charles B. Mayo, chief engineer of the Ford Motor Company, as chairman, Capt. Roy Collins has been named executive director and Lewis Firsht of Detroit is his assistant. Among other members is Capt. William Sparks of Jackson, auto horn and radio manufacturer.

THE PASSENGER LINES

California Approves State Employees' Air Travel

HAL SHIELDS, general passenger agent of Western Air Express, has made known the receipt of a letter from Ray L. Riley, controller of the state treasury, announcing the official recognition of the value of air travel. Mr. Riley's letter stated that the State Board of Control has taken action to approve expense accounts of officials and employees of all departments where items of air travel are entered.

In the past, if an employee of the state government elected to travel by air, he was allowed only the amount of the train fare between given points. Now, anyone traveling on official business may make use of the time-saving element of air transportation and be paid in full for the trip, or trips, it was said.

(*Continued on next page*)

Courtesy of Fairchild Aerial Surveys, Inc.

Valbuena Field, Mexico City, was the scene of the first Mexican air show held during Mexican Aviation Week, December 9-14.

The St. Louis Arena—largest exposition building in the World.

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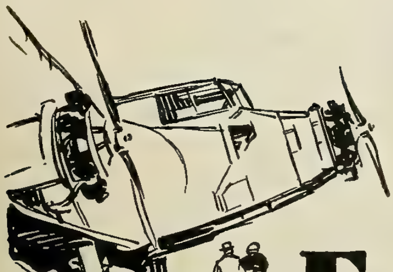

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For details write St. Louis Offices, Aeronautical Chamber of Commerce,
Suite 240, Hotel Jefferson, St. Louis, Mo.

(Continued from preceding page)

Flag Stops Added to T. A. T. Service

THE aeronautical flag stop has made its appearance. In order to serve more cities along its routes, the newly-merged T. A. T.-Maddux lines have created three such flag stops during the past few weeks, according to an announcement by J. V. Magee, vice president and general manager. The first of the stops is at Vandalia, Ohio, about nine miles north of Dayton, and another is at St. Elmo, Indiana, with a third at Terre Haute, Indiana.

Passengers will be able to board the planes at these points simply by notifying the company's representative in time to have the pilot instructed. In the case of T. A. T. planes, Mr. Magee pointed out, it will be possible to accomplish this by radio while the ship is in the air.

Stops have been made at both Dayton and St. Elmo to test the effect of the stop on the schedules. It was found that the stop consumed an average of five minutes for the landing, embarking of the passenger and taking off.

Substantial Increase in Passenger Traffic Noted

REPORTS for the first six months of 1929 from scheduled air transport lines and other aircraft operators, the analysis of which has just been completed, indicate that at least 3,527,000 passengers will have ridden in airplanes during the twelve months ending December 31st, 1929, according to Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

"Basing its figures on reports from twenty-seven out of forty scheduled air transport operators, it is estimated that 45,000 passengers were carried by air transport companies on regular schedule during the first six months of the year," Mr. Young said. "This means that an average of 254 passengers are being carried each day on established routes. The majority of flying activities, however, now consists of miscellaneous operations such as aerial sightseeing flights, air taxicab services and other forms of non-schedule operation. A recently-completed census discloses that approximately 748,000 passengers were carried by miscellaneous aircraft operators during the second quarter of the year, which means that an average of 8,311 passengers were transported daily by miscellaneous operators, or a total of 8,565 passengers carried each day on all classes of flying during the first six months of the year."

These figures appear to us to be conservative in the extreme. When the final statistics are published for the last half of the year, it will be discovered that more persons used the airways than during the first quarter and second quarter. The rapid gain in passenger traffic over the scheduled airlines has been noted and commented upon from time to time in these columns, and has been noted especially in the past few weeks. The football season upset the conservative predictions, and for some time during and since the season the more popular lines have been operating at capacity. When the final figures become public, sometime in February, we predict that there will be a yearly average of at least 10,000 passengers daily, and that the last half of the year will show a much greater passenger average than the first.

Station and restaurant of T.A.T.-Maddux Lines opened December 12 at Albuquerque, N. M. Interior appointments of the adobe style building are old Indian and modern.

Thompson to Use Skis This Winter

ALL air mail and passenger planes of the Thompson Aeronautical Corporation will be equipped with skis this winter, Richard C. (Tex) Marshall, vice president and general manager, announced quite recently.

"With the absolute need of the operation of air mail and passenger planes during the winter season, we saw that equipment would be necessary to assure us continued operation, and we therefore equipped our planes with skis as a means to that end," stated Tex.

Very few transportation companies, especially those carrying mail, can be successful if they are limited to seasonal or spasmodic operation. T. A. C.'s experience with skis last winter was successful, and by employing them on all planes this winter many Michigan and Ohio airports will be available that otherwise would not be. It will be remembered by many that last winter T. A. C. was seriously hampered by the great amount of snow on some of its airports and the apparent indifference of the communities toward the situation. Muskegon, Michigan, was perhaps the worst offender, but Bay City and Saginaw were not much better. This year, by taking a leaf from the experience of Commander Byrd, the Northern Aerial Minerals Explorations Co., Ltd., and other sub-Arctic and Polar aviators, these towns will have on-time mail deliveries whether or not they get around to removing the snow from their airports.

Pan American to Triple Passenger Service

PASSENGER mileage operated by the Pan American Airways system will be practically tripled during the next month, so that by February 1st, 1930, the passenger lines will be operating at the rate of 88,522 miles weekly, according to an announcement by J. M. Eaton, traffic manager. The company is installing radio in its planes and "block signal" safety control systems.

Oakland-Frisco Air Ferries Planned

TWO concerns are planning to inaugurate short-hop amphibion ferry systems from the Oakland Municipal Airport. Curtiss Flying Service has announced that it will provide ten-minute service between Oakland and San Francisco, and another firm, as yet unnamed, is said to be contemplating a line between Lake Merritt, in the heart of the city of Oakland, and the municipal airport.

At the same time, word came through the *Wall Street Journal*, which received a further report, that a different combine was being organized to launch an air ferry line from the Embarcadero to Twelfth and Broadway, Oakland. This line will use Loening amphibions and the running time will be ten minutes. The Embarcadero is

(Continued on next page)

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(Continued from preceding page)

a readily-accessible point in San Francisco, with four street car tracks running down Market Street to it, as well as buses, cable cars and other forms of transportation.

Change in T. A.T. Schedule

A TWO-DAY air and rail service between New York and San Francisco became effective December 12th over the combined route of the T. A. T.-Maddux lines and the Pennsylvania and Santa Fe Railroads, according to T. B. Clement, general traffic manager of the line.

The new service, which is an addition to the present service between New York and Los Angeles, will be routed via Barstow, Calif., for the eastbound movement and via Los Angeles for the westbound.

Eastbound planes will leave San Francisco, Alameda Airport, at 7:15 a. m., and after stops at Fresno and Bakersfield connect at Barstow with the eastbound transcontinental plane for Los Angeles. East of Barstow, stops are to be made at Winslow, Albuquerque and Clovis, where passengers will board the Santa Fe. The dinner stop will henceforth be Albuquerque, where Fred Harvey meals will be served in the new T. A. T.-Maddux passenger station instead of at Clovis.

NEW COMPANIES AND MERGERS

T. A. T.-Maddux Merger Completed

MERGER of Transcontinental Air Transport, Inc., and Maddux Airlines, which began several months ago with the purchase of controlling interest in Maddux by T. A. T., is now completed by the joint operation of the two lines. The new system is known as the T. A. T.-Maddux Airlines.

Under the merger, T. A. T. will be extended by more than 1,000 miles of airlines on the Pacific Coast now under the operation of Maddux lines, covering the territory from San Francisco to Agua Caliente below the Mexican border.

Among the many advantages of the merger will be the resulting unified service, permitting direct service between New York City and San Francisco, Los Angeles, San Diego and Agua Caliente, Mexico.

Officials of both lines announced that the best features of each would be retained in their joint operation. With the experience gained by both operators in their respective territories, officials are confident that an uninterrupted schedule would be maintained during the first winter of transcontinental operation.

The merger is the result of several months of close study of the transcontinental transportation problem in relation to Pacific Coast service, according to officials.

Curtiss Airports Corp. Adds New Branch

CURTISS AIRPORTS CORPORATION, owner of the new Curtiss-Steinburg Airport at St. Louis, has announced the establishment of a new branch—that of airports illumination, a department designed to serve the whole aviation industry in the field of airport illumination. L. G. Simpson, engineer, is manager of the new branch, which will provide a technical and specialized service to engineers.

NEW DEVICES AND METHODS

Super Beacon for Massachusetts

THE International Derrick and Equipment Company of Columbus, Ohio, which has furnished beacon towers and other equipment for most of the charted airways of the country, has submitted a bid for the erection of what will be one of the tallest structures in the world; an aerial super-beacon. It is planned to erect this tower in Massachusetts, the necessary capital being furnished by private enterprise.

The height from the ground to the beacon platform will be approximately one thousand feet. Plans drawn by the contractor call for construction very similar to that of the familiar airway beacon, but on a much larger scale. An observatory for conducting scientific observations will be located a few feet below the beacon platform. It is reported that the beacon's power will be such that it will be visible for 300 miles.

W. A. E. Using Ice-Warning Indicators

THE latest addition to the ranks of users of the valuable little device known as an ice-warning indicator is the Western Air Express, which has placed an order for several dozen, which will be installed on all planes belonging to the line, according to Everett Drinkwater, superintendent of maintenance for W. A. E.

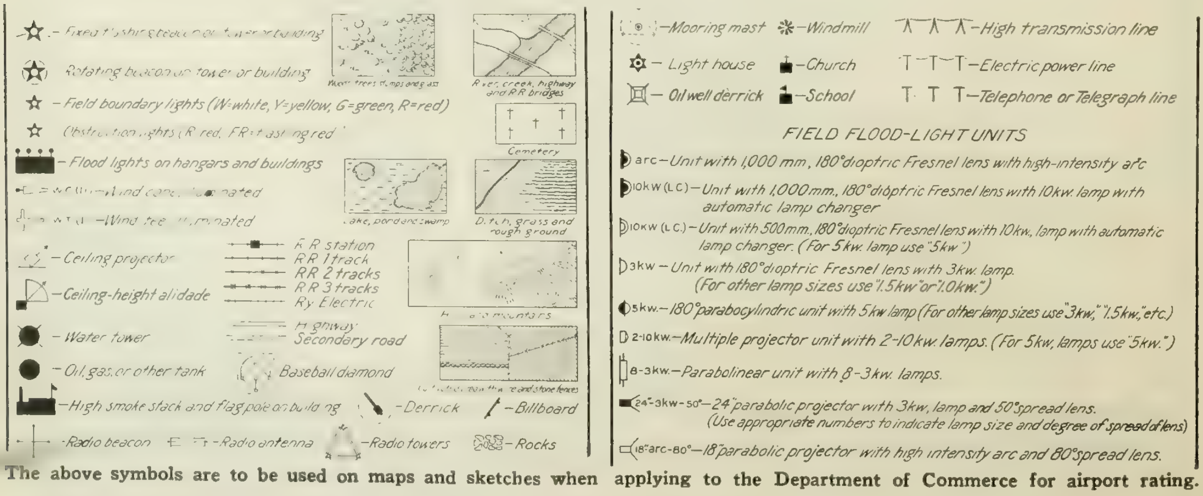
The problem of preventing ice from forming on the wing and forcing ships down has long bothered aeronautical engineers. The greatest danger is that pilots are seldom warned. The ice-warning indicator is a device made by the Boyce Moto-Meter Corporation.

SYMBOLS FOR AIRPORT RATING APPLICATION

WHEN an application is made to the Secretary of Commerce for the rating of an airport, an application form accompanied by a sketch or drawing of the field, must be submitted. The form requires the listing of full information about the airport, and the map must be complete in detail and drawn to a scale of from 100 to 300 feet to the inch.

The Aeronautics Branch of the Department of Commerce has compiled a list of symbols to be used when preparing the map. (See accompanying illustration). Individual markings are required to indicate each facility that is available at the airport, the nature of the field itself and its surroundings, including geological and structural aspects.

Forty-two separate markings are required to indicate the general nature of the field, its facilities and surroundings. By the use of these symbols on the map, provision is made for the indication of the type of beacon and whether or not it is located on a tower or building, as well as for boundary, flood lights and obstruction lights. Other symbols indicate railroad tracks, type of ground, telegraph poles, windmills, churches, schools and other buildings on and off the air port proper. Nine symbols are provided to indicate the type of field and floodlight units in use.



-Fixed flashing beacon on tower or building
Rotating beacon on tower or building
-Field boundary lights (W=white, Y=yellow, G=green, R=red)
Obstruction lights (R=red, FR=flashing red)
-Flood lights on hangars and buildings
Wind cone illuminated
-Wind tee illuminated
-Ceiling projector
-Ceiling-height alidade
-Water tower
-Oil, gas, or other tank
-High smoke stack and flag pole on building
-Radio beacon
-Radio antenna
-Radio towers
-Rocks
R R station
RR 1 track
RR 2 tracks
RR 3 tracks
Ry Electric
Highway
Secondary road
Baseball diamond
-Derrick
-Billboard
Woods, trees, stumps and grass
River, creek, highway and R R bridges
Cemetery
Lake, pond and swamp
Ditch, grass and rough ground
Hills and mountains
Cultivated land with wire and stone fences
-Mooring mast
-Windmill
-High transmission line
-Light house
-Church
-Electric power line
-Oil well derrick
-School
-Telephone or Telegraph line
FIELD FLOOD-LIGHT UNITS
arc-Unit with 1,000 mm., 180° dioptric Fresnel lens with high-intensity arc
10kw (L.C.)-Unit with 1,000 mm., 180° dioptric Fresnel lens with 10kw. lamp with automatic lamp changer
10kw (L.C.)-Unit with 500 mm., 180° dioptric Fresnel lens with 10kw., lamp with automatic lamp changer. (For 5kw. lamp use "5kw")
3kw-Unit with 180° dioptric Fresnel lens with 3kw. lamp. (For other lamp sizes use "1.5kw" or "1.0kw.")
5kw.-180° parabocylindric unit with 5kw lamp (For other lamp sizes use "3kw," "1.5kw," etc.)
2-10kw.-Multiple projector unit with 2-10kw. lamps. (For 5kw. lamps use "5kw.")
8-3kw.-Parabolinear unit with 8-3kw. lamps.
24"-3kw-50°-24" parabolic projector with 3kw. lamp and 50° spread lens. (Use appropriate numbers to indicate lamp size and degree of spread of lens)
18"arc-80°-18" parabolic projector with high intensity arc and 80° spread lens.

The above symbols are to be used on maps and sketches when applying to the Department of Commerce for airport rating.

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AIRCRAFT CORPORATION
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11-A

American Eagle Aircraft Corporation;
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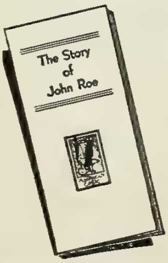
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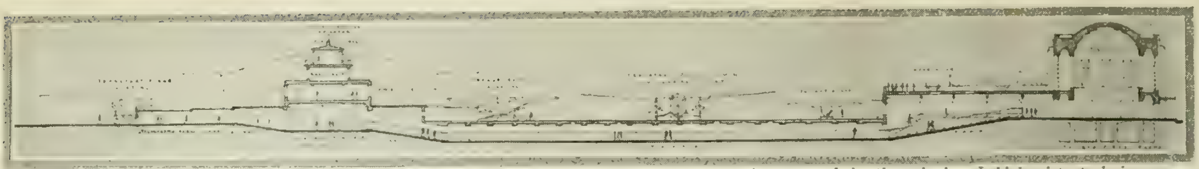
Address____________________

City____________________

State____________________



Side elevation of the loading facilities, the passenger station, and the field control tower incorporated in the winning Lehigh airport design

LEHIGH AIRPORTS AWARDS

THE winners of the Lehigh Airports Competition, the first American contest for designs of modern airports, were selected by a jury of awards, headed by Raymond Hood, well-known architect. Prizes totaling $10,200 were awarded by the Lehigh Portland Cement Company, sponsors of the competition.

First prize of $5,000 was awarded to A. C. Zimmerman and William H. Harrison, associated architects and engineers of Los Angeles, Calif., who submitted a joint design. The winning design was unanimously chosen by the jury of awards from among 257 submitted by architects, engineers and city planners from all sections of the country.

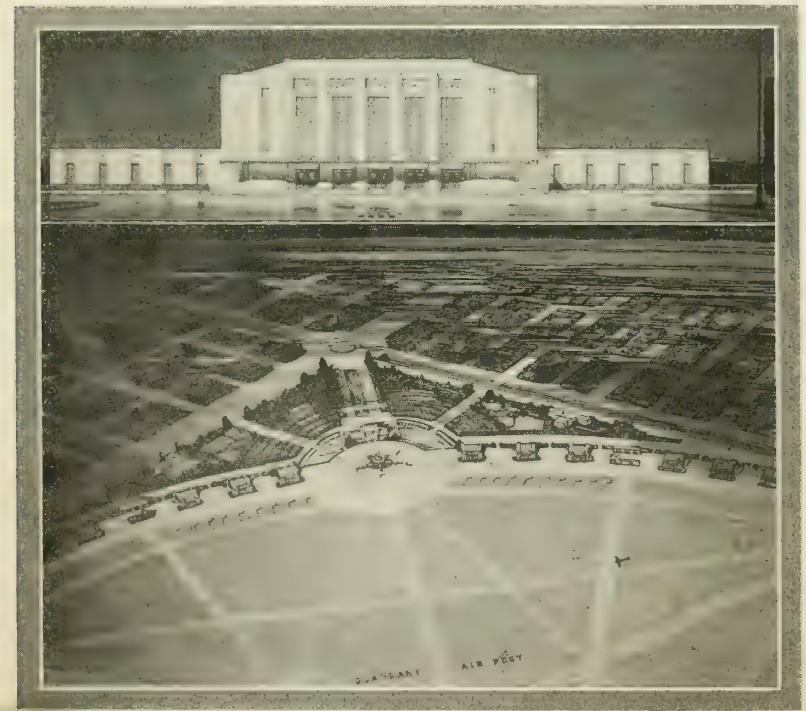
Fifteen other prizes were awarded as follows:

Second prize of $2,500 to C. Gifford Rich, architectural designer of Chicago; third prize of $1,000 to Odd Nansen, East Orange, N. J., and Latham C. Squire of New York City, who prepared their design jointly; fourth prize of $500 to Will Rice Amon, New York architect.

There were twelve honorable mentions instead of ten as originally planned, the jury of awards having requested the Lehigh Portland Cement Company to grant the extra awards to include two meritorious designs. The honorable mentions—each carrying $100 prize—are:

W. Frank Bower, Jr., Henry L. Sandlass, Alfred A. Rothmann, all of East Orange, N. J., joint design; H. Roy Kelley, Los Angeles; Edward C. Remson, New York City; James S. Nussear, Jr., architect, and William N. S. Pugh, associate, both of Baltimore, Md., joint design; George A. Robbins, Philadelphia; Robert Paul Schweikher, Denver; Lloyd N. F. Spicer, Bayside, Long Island; Edwin M. Stitt, Pittsburgh; Charles A. Stone, U. Floyd Rible, both of Los Angeles, joint design; Robert D. Stott, Howard Hutchinson, Lansing C. Holden, Jr., all of New York City, joint design; Virgil Westbrook, San Clemente, Calif.; Fred E. Sloan and Elmer A. Johnson, Chicago, Ill., joint design.

The first prize design of A. C. Zimmerman and William H. Harrison was particularly commended by the jury because of its very logical use of all elements for the comfort and convenience of passengers and fliers. Visitors and passengers reach the airport through a broad plaza at the junction of two important boulevards where provision has also been made for underground approach of a subway or a railway.



The design in the Lehigh Airports Competition which received the first award. This conception of an air terminal was planned by A. C. Zimmerman and W. H. Harrison

The approach plaza is developed as a park and is provided with huge parking spaces for automobiles, arranged in a semicircle along the passenger terminal. This building has a waiting room very similar to that of a railroad station with ticket and information booths, baggage rooms, a large restaurant and lunch-counter, news-stands and similar facilities. Provision has been made for mail, express and freight handling, with offices for immigration, customs and public health officials controlling all incoming passengers from foreign ports.

The passengers go down separate ramps to an underground passage leading to a star-shaped structure at the edge of the flying field, where telescopic steel tunnels may be extended out on short tracks to reach the doors of arriving or departing planes. The purpose of this arrangement is to keep the passengers protected from the weather at all times, and also to keep them away from revolving propellers on the plane and to control their access to the flying field itself. Thus provision has been made for maximum safety of passengers and planes, which is further enhanced by arranging the runways on the flying field so that any condition of the wind will provide for take-offs in the proper direction. These runways are joined by narrower taxi-strips and a broad semi-circular apron, which give access to either end of each runway without interfering with other planes that are arriving or departing.

The hangars, service shops, fire station and other field facilities are grouped along the semi-circular edge of the field. The triangular parking area on either side of the approach plaza is developed for the benefit of visitors, patrons and the neighboring community, with a small hotel, playground, swimming pool, stores, shops and room for such other features as may subsequently prove desirable. Care has been taken to make the entire port attractive from the air as well as from the ground.

The second prize design, submitted by C. Gifford Rich, makes similar provision for the comfort and protection of passengers and visitors to the port. The main passenger terminal, of modernistic design, has great overhead wings under which arriving and departing planes may stop and where the passengers are protected during inclement weather. An entrance plaza with appropriate public buildings, including a hotel, stores, salesrooms for airplanes and automobiles, and recreational facilities, connects the passenger terminal with the main highways intersecting near the airport. The field itself is equipped with four landing strips crossing each other near the terminal buildings and connected near their ends by a narrower taxi-strip of circular shape.

The joint plan of Odd Nansen and

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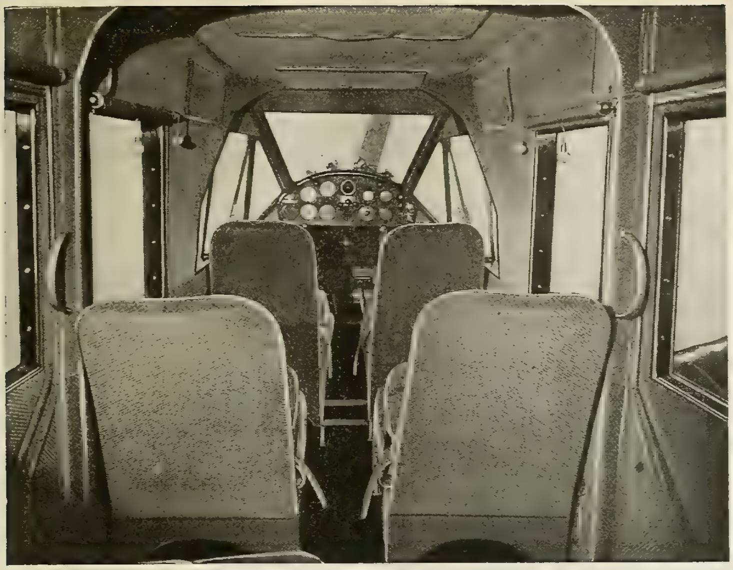

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Simmons Aircraft Division, Steel, Inc., Chamber of Commerce Bldg., Los Angeles, Cal.

Skyways, Inc., Boston Airport, East Boston, Mass.

Mr. A. H. Thurmond, 1019 R. A. Long Bldg., Kansas City, Mo.

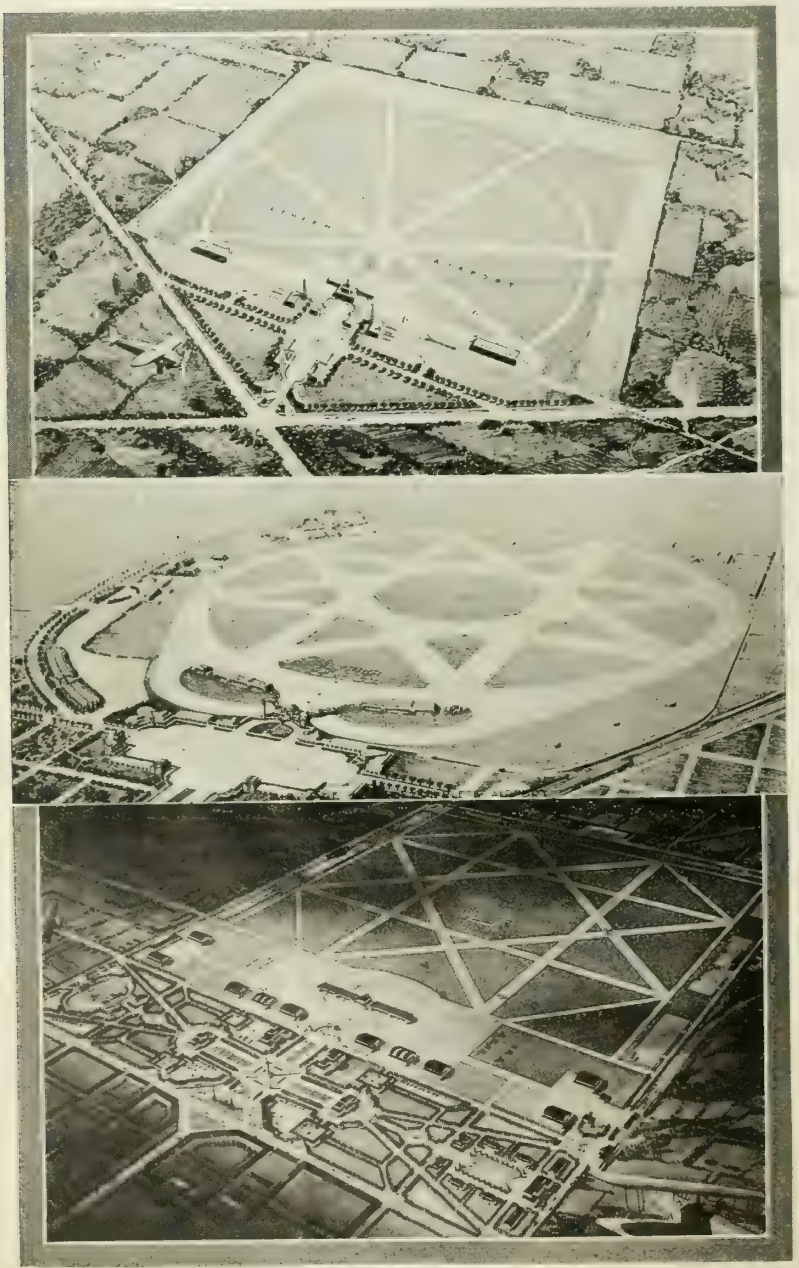
Wilkes-Barre Wyoming Valley Airport Inc., Wilkes-Barre, Pa.

BELLANCA

(*Continued from preceding page*)

Latham C. Squire, which was awarded third prize, employs a rectangular flying field with the major terminal buildings arranged along one side adjacent to a future park and plaza, which would be developed as traffic and business conditions require. The plaza would contain its own railway terminal with underground approaches, a hotel, fair grounds, grandstand, stores, shops and other appropriate business and recreational activities. The airport passenger terminal has two sets of covered docks for incoming and outgoing planes, which flank either side of the central waiting rooms.

The fourth prize design, by Will Rice Amon of New York, is based on a circular flying field with parallel runways crossing the field in four directions and separating incoming and departing planes. A modernistic main terminal building, with covered wings for loading and unloading passengers, is placed at the edge of the field and facing a plaza surrounded by stores, shops, hotel and other structures.



Upper, airport design submitted by C. Gifford Rich, who won second prize in the Lehigh competition; center, the airport plan winning the fourth award, conceived by Will Rice Amon; lower, third prize design rendered jointly by Odd Nansen and Latham C. Squire

TULSA MUNICIPAL AIRPORT

ONE of the better-known and more widely discussed airports of the Southwest is the municipal air terminal at Tulsa, Oklahoma. In size, quality of equipment and facilities, it deserves classification among the foremost air-fields of that part of the nation. As a passenger terminal—that is, in terms of transport activity—it is achieving an enviable position among the flying fields, not only of America, but of the world as well.

According to the management, this airport is able to offer what it does as a result of the fact that its development was neither haphazard nor planned too completely in advance of experience. On the contrary, it has been built by the empirical method, by the addition of such components as the growth of air transportation has made necessary and desirable. Because this procedure has been followed, each new feature of equipment has been a permanent unit; no replacement of temporary buildings or changes in the general layout of the field have been necessary thus far.

Likewise, with increased public patronage of the airlines has come concomitantly increased activity at Tulsa Municipal Airport. One week in October, 567 planes landed or took off at the airport carrying 2,578 air passengers, 2,100 of whom were passengers on the transport lines operating from the airport. According to officials at the field, this heavy passenger business established a record both for the United States and for Europe. It is said to have exceeded the greatest passenger traffic at Croydon Aerodrome, London, by 265. In sixteen months 47,009 persons had been transported by air either to or from the field, without accident.

Housing facilities on the airport consist of four large hangars of steel and stucco construction, each hangar having a capacity of twenty-five planes. A service and repair shop is located in each hangar. These hangars are connected by a concrete taxi-strip 4,000 feet in length, thus allowing planes to be moved from one hangar to another without the usual annoyance and menace of dust clouds and, in wet weather, mud.

On the south side of the field the word GAS stands out in white relief and can easily be seen from a plane flying at an altitude of 2,000 feet. Four fueling pits are located at this point, which is connected with the taxi-strip by a concrete spur, so that ships need not leave the hard surfaced area while fueling. The electric pumps are capable of delivering an aggregate quantity of eighty gallons of fuel a minute, each pump delivering a different brand of aviation gasoline. An emergency truck, having a capacity of 400 gallons and capable of pumping twenty-five gallons a minute, is maintained on the field. In addition, each hangar has its fueling pits. The entire pumping unit of the airport can, therefore, dispense 165 gallons of gasoline a minute. Gasoline storage tanks at the air-field have a capacity of 22,000 gallons.

The lighting equipment at the field is complete and modern. A revolving beacon

(*Continued on next page*)

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FEB. 15-23
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1930
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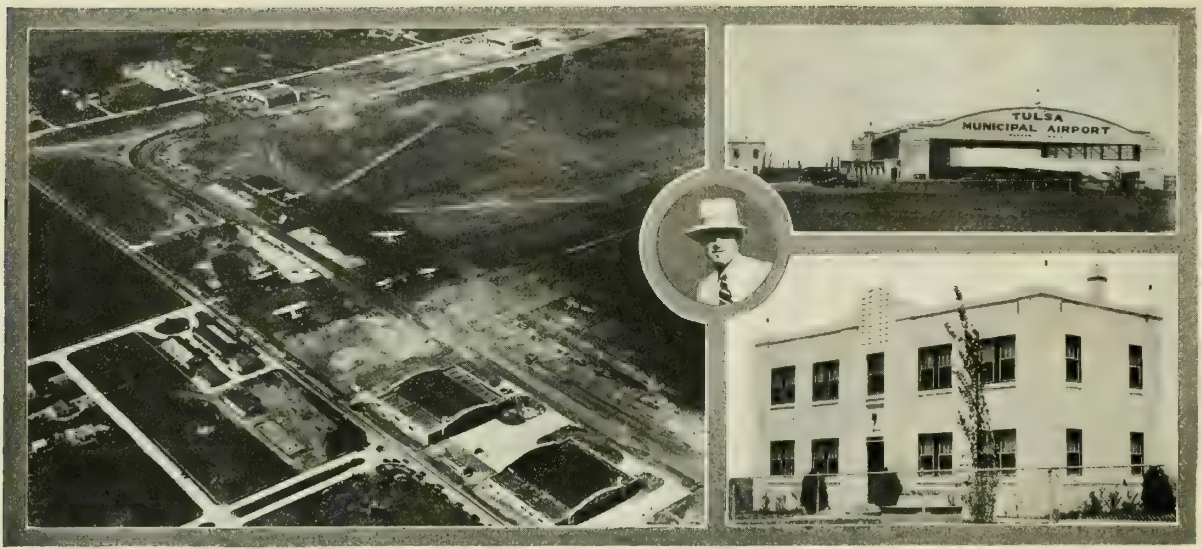
WORLD AIR FAIR

ST. LOUIS ARENA



Left, Tulsa Municipal Airport seen from the air; right, hangar No. 1, and (below) administration building. Inset, C. W. Short, Mgr.

(*Continued from preceding page*)

casts its arc for fifty-five miles. There are forty-three boundary and approach lights forming a large oval. At night the field proper normally is illuminated by two of the three 30,000,000 candlepower floodlights which have been installed. There are obstruction lights on all buildings on, and adjacent to, the airport.

As to the field itself, it consists of 420 acres of landing area and is an all-way field. The surface is sodded, naturally drained, and is said to remain dry in all usual weather conditions. Adjacent to the airport, parking space is available for 6,000 automobiles. The airport is seven miles from the city.

Operating from the municipal field are two well-known air transportation companies, the Southwest Air Fast Express and the Braniff and Central divisions of the Universal Air Lines. These lines alone have a daily schedule of thirty planes arriving and departing, and their ships are capable of carrying 220 passengers to distant cities each day. (The present daily average of passengers carried is 150.) National Air Transport operates six ships daily from the airport, carrying mail between Dallas and Chicago. The principal activity on the field is that contingent upon the operation of these airlines, though numerous oil companies and individual airplane owners operate planes from there. According to a recent estimate, there are at the port eighty-four ships, of which thirty-five are privately owned. Department of Commerce flying regulations are strictly enforced, and traffic is regulated with systematic control.

Aside from the weather reports received from over a hundred stations in the United States, the airport maintains a complete meteorological bureau, headed by A. L. McCuistion, former government weather expert. The airport station is a part of the system which furnishes weather forecasts for all parts of the country.

For those who desire meals on the field, there are two excellent restaurants, both serving first-class menus. Comfortable quarters for pilots and transient guests are located on the west side of the field away from the noise of engines and crowds of passengers and visitors

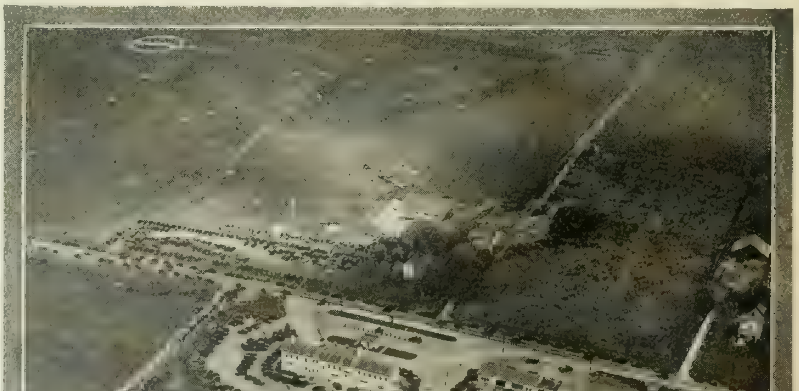
Though it is often said that municipal airports should be looked upon as public parks which furnish no revenue to a city, the Tulsa Municipal Airport has shown a consistent profit for the past eight months.

ALLTON AIRPORT, COLUMBIA, MO.

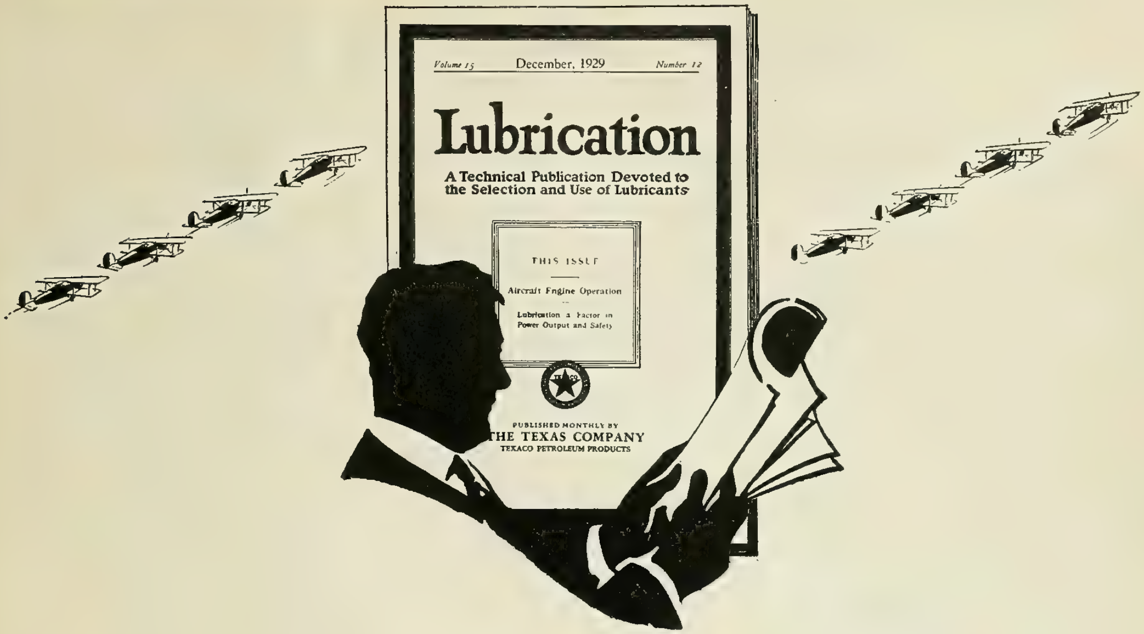
THE Allton Airport at Columbia, Mo., has been in operation for three years under the supervision of the Allton Flying Service, Inc., distributors of Waco and Curtiss-Wright products. According to the Allton company, the airport is managed under supervision calculated to instill confidence in aviation and to develop air-mindedness on the part of the general community at Columbia, and the slogan, "Flying is safe when properly conducted," has been adopted and enforced.

The Allton Airport has been designated as Site No. 11 on the St. Louis-Omaha air mail route and is equipped with boundary lights and a beacon for night flying. The surface of the field is of heavy grass sod, leveled and graded, and there is a standard circle marker. Runways are outlined with white crushed rock markers. Two hangars and a shop are located on the field, and hangar rental and airplane repair facilities are available. Aviation gasoline and oils may also be obtained.

Adjacent to the airport and located on the main highway is a forty-room hotel containing a dining room, women's smoking room, hospital, soda fountain and newsstand. According to the Allton Flying Service, because of the facilities available, many fliers stop overnight there.



Allton Airport at Columbia, Mo., showing hotel across highway from landing field



Volume 15 December, 1929 *Number 12*

Lubrication

A Technical Publication Devoted to the Selection and Use of Lubricants

THIS ISSUE

Aircraft Engine Operation

Lubrication a Factor in Power Output and Safety

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The December issue of The Texas Company's monthly magazine "Lubrication," is devoted wholly to the subject of effective aircraft engine lubrication. It contains a most interesting and complete discussion of this vital subject.

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TECHNICAL

WASP-POWERED RYAN B-7 MONOPLANE

THE new B-7 Ryan Brougham, recently approved by the Department of Commerce, typifies the trend toward greater speed, and more attention to the comfort of passengers and pilot. The designers of the plane have paid as much attention to the appearance and interior design of the plane as they have to such features as safety, speed, reliability, stability and adaptability to either commercial or private operation.

The ship is a six-place job, quite similar in general design to the B-5 model (which will continue to be produced), the main difference being that the B-7 is equipped with the Wasp 420-horsepower engine rather than the Wright Whirlwind.

The Wasp engine gives the plane a high speed of 150 miles an hour and a conservative cruising speed of 120 miles. The plane has shown a climbing ability of 1,350 feet per minute and take-off in eight seconds. It has a service ceiling of 20,000 feet, and an absolute altitude of well over 25,000 feet.

The ship is designed as an all-purpose plane suitable for the use of air transport lines, executives of large corporations, surveys of territory for power and oil companies, private ownership or for commercial operation for passenger hopping, student instruction, and other such services.

In designing the new ship, the engineering staff of the Ryan Aircraft Corporation has endeavored to develop a plane which has as nearly perfect stability as practical. Rigid flight tests extending over the last few weeks have shown that the plane has a performance beyond the expectations of even the engineering department. According to company officials, the plane can be nosed up into a vertical stall, and will automatically come out of it with flying speed maintained, without touching the controls. With the ship balanced with the stabilizer, it is said, the plane practically flies itself, automatically maintaining directional, longitudinal, and lateral stability. Pilots have flown a compass course in this plane on cross-country flights for twenty minutes at a time without touching the controls.

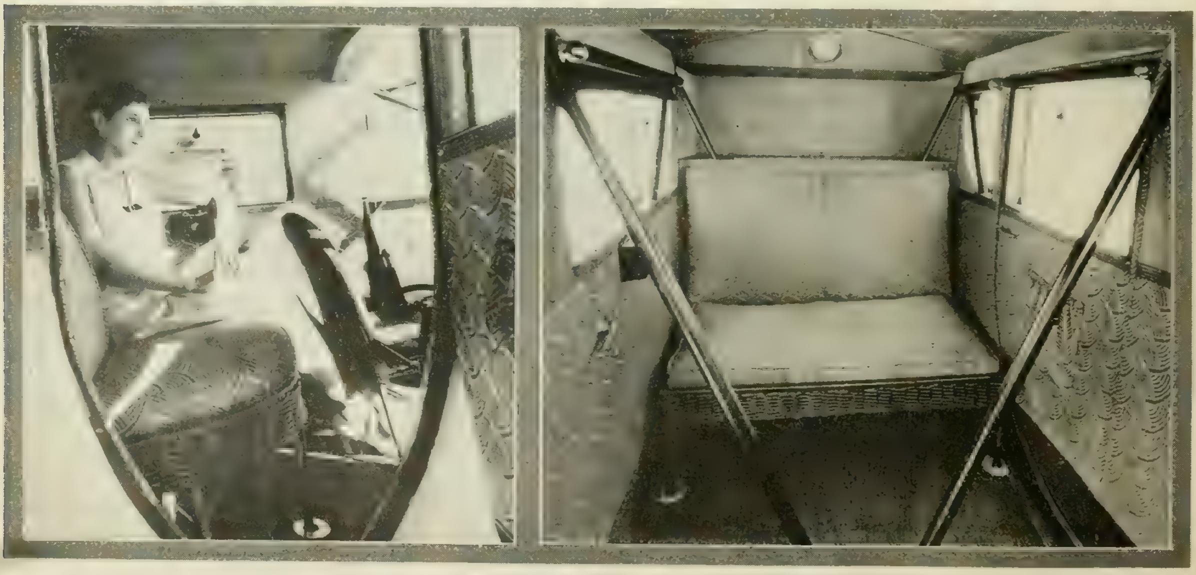
The standard Ryan wing, with its combination high lift and speed, has been retained with only slight changes to improve its aerodynamic efficiency and to carry the additional weight of a more powerful engine. It is built in one continuous panel, 42 feet, four inches in length, with a chord of seven feet. The Clark "Y" section or rib outline, which was used on the *Spirit of St. Louis*, has always been standard on the Ryan. It is built on two sturdy spars of spruce, braced by forty-one full width ribs, gusseted with mahogany plywood to insure greater strength. Internally, drawn steel adjustable tie rods are used instead of wires and the bays holding the two gasoline tanks are braced with steel compression rods. The leading edge is covered with plywood, and the wing end section is faired with balsa wood to the tip, to make a more perfect airfoil.

Finished in Lindbergh silver Berryloid pigmented dope with red trimmings and attractive molding and paneling, the plane presents a handsome appearance and is easily seen at high altitudes.

A group of experienced craftsmen in coach building and upholstering have been brought from the automobile industry to take charge of these important departments. Special blue plush mohair upholstery is used throughout as standard equipment, the material matching the color of the plane. The color scheme is carried out in the trimmings and broadlace, and the interior of the cabin is built after the precedent of limousines. The majority of the purchasers of a plane of this class, however, desire to choose their own special color schemes and upholstery, so that their plane will be even more distinctive in appearance.

The two front seats are unique to the Ryan. The left pilot's seat is adjustable to the center of the cabin by one simple motion and the right seat folds and locks against the wall when a full load is not being carried, allowing center control for the pilot. Dual control for both front seats may be installed in ten minutes and is standard equipment.

The cabin has been designed to give the passengers an unusual amount of leg room. The interior is fitted with such accessories as window curtains, non-shatterable glass, cigarette cases, lights, wide sedan type doors staggered for easy entrance and exit, and a heater that has been found to maintain a comfortable cabin temperature in unusually cold weather. The cabin is built with the characteristic segment shaped windows in the forward part which offer a wide range of vision to both passengers and pilot. The automobile crank operated windows are equipped with triplex non-shatterable glass. All controls are carried under the cabin floor so that the interior presents a clean appearance.



Luxurious interior and comfortable seating arrangement for passengers in the Ryan Wasp-powered B-7 monoplane

moving parts, and drawing less amperage and voltage than the ordinary automobile starting mechanism.

The starter, which will be produced by the same company as the variable-pitch propeller, is operated from the cockpit by a method similar to that used on automobile starters. The starter is ineffective while the engine is running, since it is disengaged from the main mechanism if the engine is turning over. Provision is made for an auxiliary crank which may be installed either inside or outside the cockpit.

KANT SLIP PLIER

COMBINED in the design of the Kant Slip Plier, manufactured by the Kant Slip Plier and Tool Company of Chicago, are the three mechanical principles of the cam, the fulcrum and the wedge. The pin has been eliminated as a point of strain and is used for the purpose of holding the two members of the plier together.

The Kant Slip Plier is designed to grip, hold and turn a pipe in close quarters or a pipe lying flat on a floor or flush against a wall, and to hold nuts with rounded corners. This work is done by the plier without the use of gears or the necessity of changing any of its parts. It has no screw adjustment whatsoever. The plier is a drop-forged tool made of a special formula alloy chrome vanadium steel.

The Kant Slip Plier is designed to permit the cam to slide the fulcrum to its correct position irrespective of the load. The sliding action of both the cam and the fulcrum combines to wedge the work between the jaws, producing the grip. The fact that the fulcrum is always close to the load is one reason for the tremendous power claimed for this tool.

SAILPLANING

By H. HARTSHELL

IN every region of the earth where daily winds are dependable, birds may be seen circling overhead, hour after hour, with almost no muscular effort. In regions where brisk winds may be counted on, the number, variety and size of soaring birds increase. In the trade wind regions we find the great albatross and its like soaring, and even the fish flying.

Although soaring flight is necessarily slow, the air speed depending on the wind speed, sailplaning promises to become a paramount sport. It will then be easy and cheap to get in a few hundred hours in the air.

Since birds can and do sail on the winds with the relatively weak structural materials available to them—bone, sinew and feathers—it is highly probable that man can in some respects excel them in soaring. It is possible to predict how sailplaning may be practiced in the future and the principles on which the sailplane may be flown.

Nature shows us soaring birds with great broad wings and slow air speeds where only breezes may be counted on and birds with thicker, narrower wings and much higher air speeds where brisk winds are the usual order of the day. Some soaring birds have wings that are quite flat and some have wings ordinarily curved concave down from shoulder to tip. With the wide variety in flying mechanisms exhibited in nature, it is only reasonable to suppose that a wider range of flying mechanisms is available to man from which to choose the best.

For discussion in this article a monoplane glider is chosen, with a high aspect ratio and a safely controllable flying speed as low as twenty to twenty-five miles per hour. The wings, let us assume, are faired into the fuselage and are of such section and shape that side slip does not have a great effect upon their lift or the flight of the sailplane. The wings are fastened to the fuselage as low as possible with reference to the center of mass of the sailplane and its load. The ends of the long wings are equipped with very powerful ailerons.

Since the sailplane is designed to fly well while side slipping, there are no fixed fins in front of the rudder. In addition to the rudder on the tail, there are two other rudder surfaces, one half-way out on the top of each wing. These three rudder surfaces are the sails of the sailplane.

This sailplane would be launched directly against a uniform horizontal wind of V miles per hour and it would glide until it got under way. When everything was working smoothly and the flying speed (measured in the plans of symmetry) had become steady at V miles per hour, the sails would be brought into action. Instead of standing in a neutral position with reference to the relative air stream, they would be given an angle of attack that would impress a side force on the sailplane and start it turning. The wings of the sailplane would remain horizontal, and the contripetal force of the sailplane would originate in the vertical sail areas.

Ruddering to supply yawing moments could, of course, be accomplished by a small differential action between the pair of sail areas mounted above the wings with effective center of pressure somewhat in front of the center of mass of the sailplane, and the rudder on the tail with a center of pressure well behind the center of mass. Rolling moments that might accompany side forces from the sail area could be balanced by the powerful ailerons at the ends of the long wings.

The sailplane turn would be made so that the velocity of its center of mass relative to the earth would always be in the plane of symmetry. In other words, if the sail-flier looked through a glass window in the bottom of the cabin with a grating of fore-and-aft lines etched on it, all objects seen on the ground would appear to travel along the etched lines. The maintenance of the earth velocity in the plane of symmetry would be accomplished merely by ruddering, and not by changing the total side force on the sailplane.

A fundamental pilotage rule holding good throughout the cycle of motions would be to bank the sail areas against side slip or to hold them so banked when side slip persists.

The turn was started with the sailplane flying against wind and, accordingly, the plane of symmetry parallel to the wind direction. As the turn progressed, the plane of symmetry would approach a position perpendicular to the wind direction. If α is the angle between the wind direction and the plane of symmetry measured on the ground, figure 1 illustrates the velocities acting on the sailplane when the plane of symmetry has turned away from its starting position through any angle, α.

The flying speed or air speed measured in the plane of symmetry, as with any other airplane, would be determinate and even when the relative air stream presented wide angles of yaw, this flying speed would not be increased appreciably by a forward force acting on the sailplane. The sailplane might fly horizontally or climb under the action of such a force without a material change in the flying speed V measured in the plane of symmetry.

The determinate nature of the flying speed of an airplane with fixed angle of attack even under a varying driving force (i.e., whether climbing or gliding) deserves attention. The value of this flying speed is fixed by the weight of the airplane and constitutes a constraint on the motion of the airplane exerted through the force of gravity by the earth. The string holding a flying kite acts as a constraint on the kite's motion from the earth. This similarity is important. The flying speed gives, in fact, a constraint exerted by the earth on the freely flying airplane, and may be used in soaring in lieu of a kite string.

Under the conditions of the turn, the earth velocity is parallel to the plane of symmetry. Under the constraint of a determinate flying speed, the air speed measured in the plane of symmetry is V. The magnitude of the earth velocity e may therefore be deduced:

$$e = V - W \cos^{\alpha}$$

Knowing the magnitude and direction of the wind W, and the magnitude and direction of the earth velocity e, under the principles of kinematics, the air velocity v of the center of mass of the airplane is the vector difference between these quantities. (The earth velocity is the vector sum of the air velocity and the wind.) The air velocity is equal and opposite to the relative air stream. To

(*Continued on next page*)

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accomplish this combination of vectors, analytically, the wind, W, is treated as of two components, namely, $W\ sin\ ^{a}$ and $W\ cos\ ^{a}$. Accordingly, in magnitude,

$$v = \sqrt{(V - cos^{a} + W\ cos^{a})^2 + (W\ sin^{a})^2}$$
$$= \sqrt{V^2 + (W\ sin^{a})^2}$$

The air velocity, v, therefore may be thought of as the vector sum of two components, namely, (1) the flying speed in the plane of symmetry V, and (2) a transverse velocity equal and opposite to $W\ sin\ ^{a}$. See figure 1.

Under these conditions, the sailplane would be flying in a relative air stream coming over a bow quarter like the relative wind on a sail boat in tack, and making an angle, θ, with the plane of symmetry,

$$\theta = tan—1\left\{\frac{W\ sin\ x}{V}\right\}.$$

The direction of the air velocity of the center of mass of the sailplane is expressed by the angle θ.

The wing section and shape were chosen so as not to be materially affected by a transverse air velocity or side slip, and the lift force from the wings will be vertical and equal to the weight.

The lift force L, from the sail area, however, will be horizontal and perpendicular to the relative air stream, and therefore will have a forward component projected in the plane of symmetry, $L\ sin\ \theta$. See figure 2.

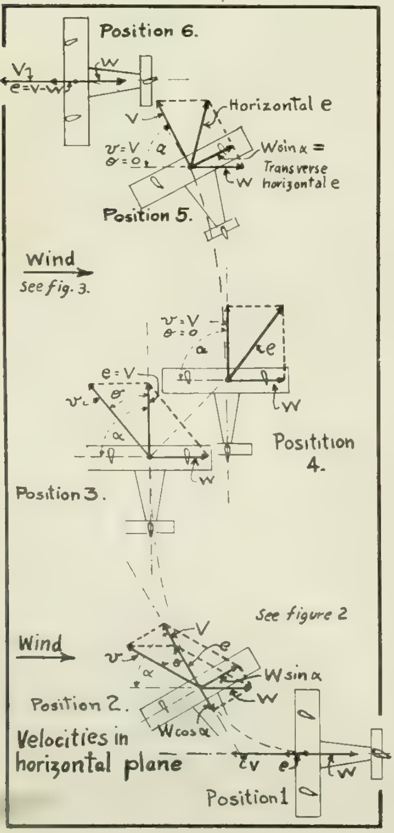


Figure 1

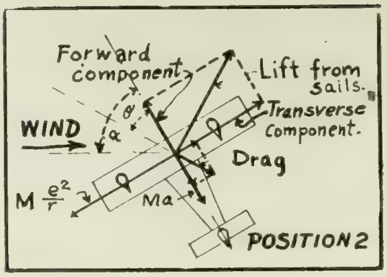


Figure 2

The forward component force from the sail area acts like a propeller thrust and like a horizontal propeller thrust may lift the sailplane under the constraint of the determinate flying speed. In other words, if the forward component of the force from the sail area were larger than necessary to maintain the determinate flying speed, the sailplane would climb.

To summarize the situation illustrated in figure 2, the sailplane will be under the following horizontal forces from the air: (1) A component force from the sail area acting forward in the plane of symmetry $L\ sin\ \theta$, (2) flight resistance forces acting backward in the plane of symmetry, and (3) a component from the sail area, $L\ cos\ \theta$, together with a component of the drag both acting transversely (perpendicular to the plane of symmetry).

The transverse forces from the air are balanced by a centrifugal force. (An inertia force dependent upon the mass and acceleration of the sailplane.)

As the turn progresses, from a position of flight against wind toward a position of flight across wind, the earth speed of the sailplane must increase to maintain the determinate flying speed. Since the transverse force components from the air are perpendicular to the earth velocity, the energy referred to the earth represented by the increasing speed must be supplied by the forward force component, $L\ sin\ \theta$. The forward force component from the sail area must therefore supply power for an increase in earth speed of the sailplane, as well as flying losses and gain in altitude, if any. This, however, is a matter of design, because the ratio of average forward component to average transverse component of force from the sail area can be increased by reducing the flying speed of the sailplane, such as by increasing the wing area. The flying speed of the sailplane measured in the plane of symmetry is thus limited by the speed of the wind in which the sailplane is designed to fly.

In the particular flying cycle here described, the turn with the earth velocity maintained in the plane of symmetry would be carried on from the starting position of flight against wind to a position of flight across wind. The angle α through which the plane of symmetry would have rotated would then have become a right angle. At this point the earth speed would have increased from V-W to V and the transverse component of the air velocity would have increased in magnitude from zero to W.

When the sailplane had attained a direction of flight across wind (plane of symmetry perpendicular to wind direction), the turning would be stopped by ruddering so that plane of symmetry continued for a time to be perpendicular to the wind direction. The earth velocity of the center of mass of the sailplane would from that moment cease to lie in the plane of symmetry. A transverse component of the earth velocity would from that moment appear and increase. While the turn was in progress the transverse force component from the sail areas was balanced by a centrifugal force; but, with the turning stopped, the transverse force component from the sail areas would be balanced by a transverse linear acceleration of the sailplane, resulting in a transverse earth velocity component beginning with zero and increasing.

As the transverse component of the earth velocity increased, the transverse components of the relative air velocity would decrease. The flying speed measured in the plane of symmetry would continue to have its determinate value V. As soon as the transverse earth velocity component had increased to a value W, there would be no transverse component of the relative air velocity and it would lie in the plane of symmetry.

There would be a forward force component from the sail areas as long as there is an angle, θ between the relative air stream and the plane of symmetry. As soon as the relative air stream had become parallel to the plane of symmetry the forward force component, $L\ sin\ \theta$, would disappear. The sailing action would cease.

When the angle between the relative air stream and the plane of symmetry had become zero, there would be no side slip and the pilot would move his sail areas to a neutral position, thus bringing the transverse force to zero. If the transverse motion should overshoot so that the relative air stream commenced to appear over the leeward bow quarter of the sailplane, the pilot under his rule to bank or hold bank against side slip would slightly reverse the bank of the sail areas and thus start a turn back against wind. This would put the sailplane in correct attitude to continue the cycle of motions.

At the end of the sailing action just described, the sailplane would be found completely entrained in the wind. The air velocity would lie in the plane of symmetry. It would then be necessary to maneuver the sailplane back to a position favorable for repeating the sailing action. While the sailplane was getting back to a position against wind, no more flying energy could be taken from the wind.

The kinetic energy of the sailplane referred to the earth in flight across wind would be considerably greater than in flight against wind. There is no fundamental reason why the kinetic energy represented by this difference in earth speed should not be useful to sustain flight in a turn from across wind back to against wind.

The earth speed of the sailplane in flight across wind, when entrained in the wind, would be $\sqrt{V^2 + W^2}$, and in flight against wind $V - W$. The difference in earth speed represents energy with reference to the earth that, in any event, will have to be expended on the air in getting back to a position of flight against wind.

If a turn could be made from flight across wind to flight against wind with all forces from the air perpendicular to the earth velocity, except flight resistance forces in the plane of symmetry, under the principles of dynamics, the kinetic energy released by the reduction in earth speed during the turn would drive the sailplane, and, acting against the determinate flying speed in the plane of symmetry might result in a gain in altitude. The problem is then to find a flight maneuver in which all forces from the air (sail area and wings combined) would be perpendicular to the earth velocity throughout the turn from across wind to against wind, except drag and flight resistance forces in the plane of symmetry. The forces of particular interest, therefore, and also the velocities, may be pictured by their projection in a transverse vertical plane, perpendicular to the plane of symmetry, passing through the center of mass, and moving with the sailplane. See figure 3.

In the solution of this problem it is found that the following conditions must obtain throughout the turn: The relative air stream must flow parallel to the plane of symmetry. The horizontal component of the earth velocity projected in the transverse vertical plane must be always exactly equal to the horizontal wind projected in this plane. To meet these conditions the earth velocity component in the transverse vertical plane would vary as the turn progressed, just as the projection of the horizontal wind varies. To accomplish this change in earth speed while at the same time the combined force from air supplied by sails and wings was perpendicular to the earth velocity would require the action of some third body on the sailplane. Such a third body would be at hand in the mass of the earth acting on the sailplane through the force of gravity.

The swing of a pendulum is an illustration of the motion necessary to this problem. The force in the string is always perpendicular to the earth velocity of the pendulum bob and does no work on it. The change in earth speed and energy during the swing of the pendulum bob is accomplished by a component of its weight. This is exactly the needed motion projected in the transverse vertical plane when added to a horizontal turn. Accordingly, the mass of the sailplane would take the place of a pendulum bob and the force from the air on wings and sails combined would take the place of the string supporting the pendulum bob. As the sailplane made the turn it would have to swing like a pendulum so that the horizontal component of the pendulum velocity is exactly equal to the component of the wind projected in the transverse vertical plane.

At the beginning of the turn from across wind to against wind, the sailplane would be flying with a horizontal transverse earth velocity component equal to the wind. At that instant the vertical force from the wings would be increased to a value greater than the weight of the sailplane. There should be no lateral force from the sail areas at that instant, except a horizontal contripetal force to account for a horizontal turn during the pendulum action. The vertical force from the wings should be equal to the vertical force on a pendulum bob when in its lowest position with a horizontal velocity equal to the wind and about to swing up. The increased force from the wings would act like a centripetal force on the transverse earth velocity of the sailplane and begin the swing up in the transverse vertical plane. As the swing proceeds, the sail areas would be brought into action to supply the horizontal component of the centripetal force, while the wings supply the vertical component. The vertical force from the wings would be continually reduced as the force on the sail areas increased. The pilot could know when to make the sudden increase in vertical force from the wings, because, at the proper moment for it, the side slip of the sailing action would have come to zero with a tendency to cross to the opposite side of the plane of symmetry.

The pendulum action would have to be synchronized with the horizontal turn of the sailplane so that, when the sailplane was in a position across wind, it would be at the bottom of the pendulum swing, relatively, and when it came around to a position facing wind it would have reached the top of its swing, relatively. The sailplane would have to be ruddered as necessary so that it would always face the relative air stream.

It must be remembered that any uniform motion of climb or descent, or any motion resulting from forces in the vertical plane of symmetry might be superimposed on the pendulum and turning motions just described.

The pendulum motion in the transverse vertical plane accounts only for the transverse earth velocity of the sailplane due to the wind. Since in the position of flight across wind, when fully entrained in the wind, the magnitude of the earth velocity of the sailplane would be $\sqrt{V^2 + W^2}$, and in position of flight against wind $V - W$, it is evident that the fore-and-aft earth velocity of the sailplane would also be reduced in magnitude during the turn. The reduction of the fore-and-aft component of the earth velocity of the sailplane would result in a linear acceleration force acting against the flight resistance forces in the plane of symmetry. Under the constraint imposed by the determinate flying speed in the plane of symmetry, that would prevent an increase in speed from a longitudinal force, flying losses and gain in altitude could be supplied.

It follows from the cycle of motions constituting the soaring process, that, to soar, a flying mechanism is necessary in which the horizontal forces from the air and the vertical forces from the air may be varied independently. Therefore, no glider built like an airplane can soar effectively. A soaring action is possible in some of the best performing German gliders. A very large rudder set close to the wings with little or no vertical fin in front of it, acts to an extent like a sail area when moments are balanced by powerful ailerons near the ends of long wings. In the famous German *Hanover*, not only the large rudder, but the pair of pants enclosing the landing gear struts to fair them, acted to an extent like sail areas.

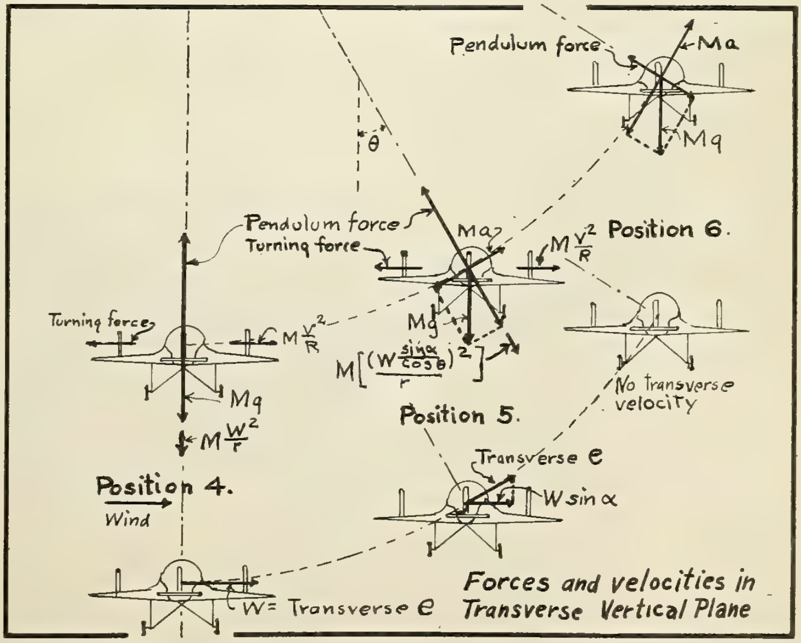


Figure 3. Forces and velocities projected in a transverse vertical plane

THE HEATH SEAPLANE PARASOL

THE Heath Seaplane Parasol is a single-place plane powered with a Heath-Henderson four-cylinder vertical, in-line, air-cooled engine of 27 horsepower, and weighs 340 pounds equipped with pontoons. This light plane is manufactured by the Heath Airplane Company of Chicago, Ill.

The Heath Seaplane Parasol is designed for sport or business flying and, according to the Heath company, its maneuverability is not hampered by the pontoons.

The wings are of conventional design and construction with spruce spars and spruce ribs and webs. Two panels are used, pinned together without a center section. The wings are supported above the fuselage by two sets of V-struts, one in front and one aft of the cockpit, and two parallel steel tube struts on each side of the fuselage, running from the bottom longerons to about sixty per cent of the length of the wing panels. A fuel tank of six-gallon capacity is located in the center of the wing. Feed is by gravity. The wings of the Parasol weigh eighteen pounds each side, when covered. Wing tips are made of steel tubing and have rounded ends. The wing covering is of special light airplane fabric weighing only sixty per cent as much as heavy fabric.

The floats are nine feet three inches long, twelve inches deep and sixteen inches wide. They are set four feet apart on centers and weigh twenty-nine pounds each. They are constructed with a spruce frame-work, over which water-proof plywood is glued and held in place with brass wood screws. The plywood is covered with linen aircraft fabric to which six coats of dope are applied. The step on each float is approximately one-third of the way from the rear of the pontoon. Two one-inch vent pipes feed each step. The pontoon gear is constructed to permit a change from floats to landplane gear without alteration of the fuselage or the fittings.

The converted Heath-Henderson engine which powers the Heath Seaplane Parasol develops 27 horsepower at 3,000 revolutions per minute. It is a four-cylinder, vertical, in-line, air-cooled type of power plant and weighs 115 pounds including the propeller. The engine has an oil pressure of from fifty to ninety pounds and an oil capacity of six quarts. Gasoline consumption is 1½ gallons per hour. A special Heath wood propeller four feet six inches in diameter is standard equipment.

Specifications

Span	25 feet
Chord	4 feet 6 inches
Wing area	110 square feet
Angle of incidence	1 degree
Length overall	16 feet 9 inches
Height overall	5 feet 10 inches
Gas capacity	5 gallons
Oil capacity	6 quarts

Areas

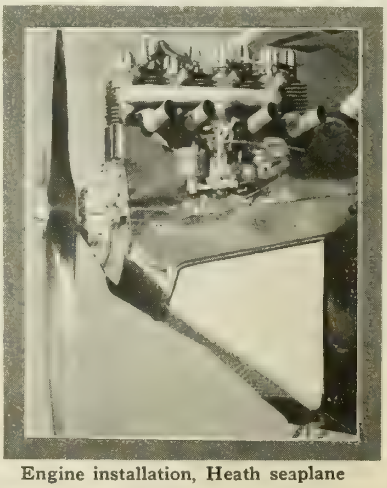
Aileron area	10 square feet
Elevator area	5.2 square feet
Stabilizer area	5.5 square feet
Rudder area	3.8 square feet

Weights

Weight empty	340 pounds
Useful load	300 pounds

Performances

High speed	70 miles per hour
Landing speed	28 miles per hour
Climb, first minute	600 feet
Take-off time	8 seconds
Cruising radius	200 miles



Engine installation, Heath seaplane

RECENTLY ISSUED AERO PATENTS

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trademark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c. each. State number of patent and name of inventor when ordering.

Process and apparatus for making aerial photographs. Leon T. Eliel, Los Angeles, Cal. (No. 1,735,109)

Flying-machine. George D. Higgins, Los Angeles, Cal. (No. 1,735,115)

Airplane. Paola P. Worrell, Chester, Idaho. (No. 1,735,308)

Aerial-mail carrier. Roy Fisher, Los Angeles, Cal. (No. 1,735,385)

Propeller-guard. William J. Danckwart, Corning, Cal. (No. 1,735,675)

Landing-gear for airplanes. Elliot Daland, Torresdale, Pa.; assignor to Keystone Aircraft Corporation, Bristol, Pa. (No. 1,735,852)

Airplane-helicopter. Walter I. O'Neill, New York, N. Y. (No. 1,735,872)

Propeller-guard. Griffin C. Thrift, Houston, Tex. (No. 1,735,912)

Aeroplane. Richard V. Spencer, Los Angeles, Cal. (No. 1,736,226)

Aircraft control mechanism. Asa J. Styles, Esmond, N. Dak. (No. 1,736,230)

Aeronautical vessel. Jakob Hojnowski, Nekoosa, Wis. (No. 1,736,263)

Aircraft. Edward B. Wilford, Merion, Pa. (No. 1,736,299)

Airplane. Edward B. Wilford, Merion, Pa. (No. 1,736,300)

Airship. Claude H. Freese, Los Angeles, Cal. (No. 1,736,439)

Sky writing. Richard L. and Dorian Bailey, Seaforth, England. (No. 1,736,516)

Manually-driven aeroplane. Theodhor Leka, New York, N. Y. (No. 1,736,541)

Airplane. Eugene Schmidt, St. Paul, Minn. (No. 1,736,632)

Means for driving power-operated vehicles, particularly aircraft. Alois Helfenstein, Vienna, Austria. (No. 1,737,011)

Lift mechanism for aircraft. George P

Wagner, New York, N. Y.; assignor to Air Line Transportation Co., Philadelphia, Pa. (No. 1,737,035)

Motor-cooling system. Arthur Nutt, Kenmore, N. Y.; assignor to Curtiss Aeroplane & Motor Corporation. (No. 1,737,122)

Dump-valve for fluid-containers. George A. Page, Jr., Freeport, N. Y.; assignor to Curtiss Aeroplane & Motor Corporation. (No. 1,737,123)

Method of effecting soaring flights and aeroplane therefor. Arthur Halstead, Clarendon, Va. (No. 1,737,191)

Aeroplane. Charles L. Weltner, Parkers-

Means for picking up cargo by aircraft. Robert S. Ormand, Bessemer City, N. C. (No. 1,737,326)

Take-off and landing apparatus for aeroplanes. Nicholas J. Verrett, Memphis, Tenn. (No. 1,737,483)

Airplane. George M. Lewis, Detroit, Mich. (No. 1,737,596)

Parachute. Charles Broadwick, San Francisco, Cal. (No. 1,737,913)

Aeroplane. Strawther Sisson, Hazel, Ky. (No. 1,737,951)

Flying-machine. Pablo Escobedo, East St. Louis, Ill. (No. 1,737,963)

Safety appliance for aeroplanes. Charles H. Gunn, San Francisco, Cal. (No. 1,738,001)

Flying-machine. Herman H. D. Klinker, New York, N. Y. (No. 1,738,010)

Airship. George Krisch, St. Louis, Mo. (No. 1,738,187)

Aeroplane-handling structure. Willis J. Perkins, Grand Rapids, Mich. (No. 1,738,261)

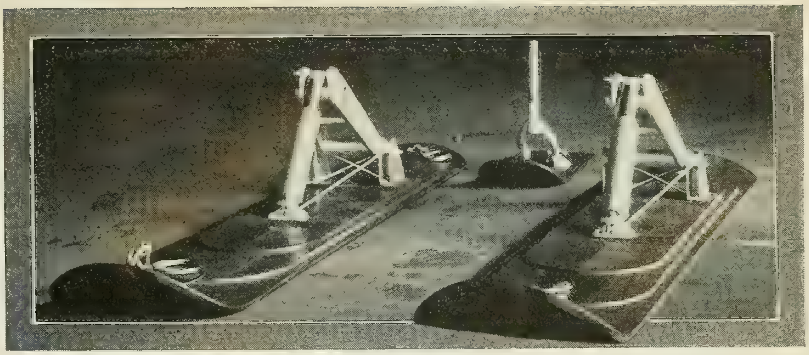
Wing-structure-varying device for aeroplanes. Aldo Tammeo, Genoa, Italy. (No. 1,738,463)

Aeroplane of duck-type construction. Henrich Focke, Bremen, Germany. (No. 1,738,568)

Aeroplane. Sverre Rasmussen, New York, N. Y. (No. 1,738,611)

Airplane. Adolf Rohrbach, Berlin-Wilmersdorf, Germany; assignor to Rohrbach Patents Corporation (of Delaware). (No. 1,738,670)

Yieldable landing-platform for aeroplanes. Willis C. Ward, Orchard Lake, Mich. (No. 1,739,193)



OILDRAULIC SKIS

A NEW type ski fitted with a Junior Oildraulic shock absorbing leg has been introduced by the Aircraft Products Corporation of Detroit. Officially designated the Oildraulic Ski, this snow-landing gear is designed to take up such landing shocks as are ordinarily absorbed by the inflated pneumatic tires on a landplane. The accompanying illustration shows a set of skis of this type to be used on Lockheed plane in service with the Canadian-American Airlines in the Northwest.

After the first of the year, these skis and other products of the Aircraft Products Corporation will be manufactured for the Canadian market in a Canadian factory.

CABINAIRE BIPLANE

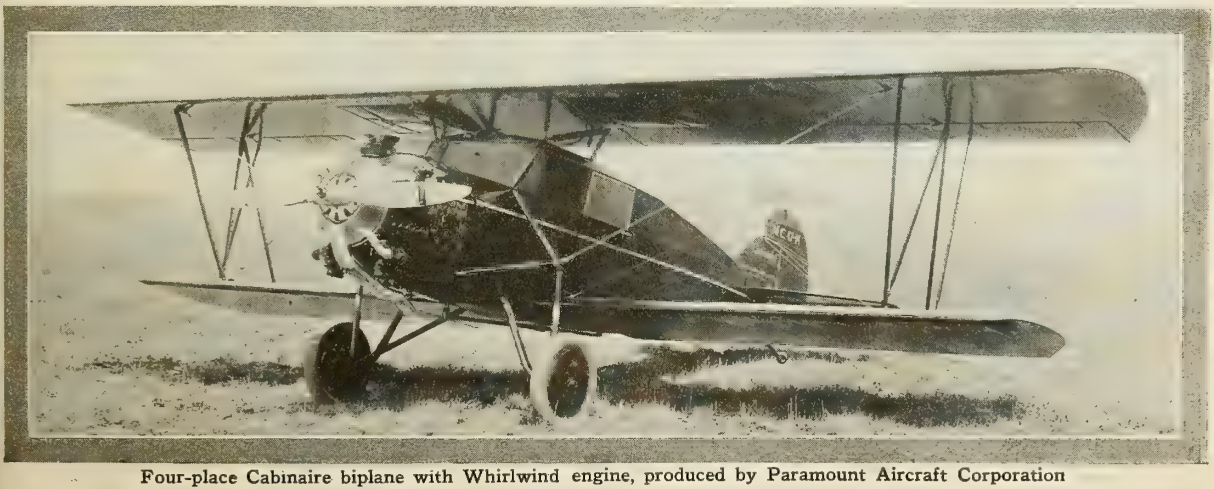
APPROVED Type Certificate No. 265 has been issued by the Department of Commerce for the Cabinaire 165, manufactured by the Paramount Aircraft Corporation of Saginaw, Michigan. The Paramount company has increased production facilities for the manufacture of the ship.

The Cabinaire 165 is a four-place cabin biplane powered with a Wright Whirlwind 165 engine. The plane is designed for easy handling on the ground, particularly on a field of limited space, and to meet the requirement of all-around flying, especially for business purposes. The Cabinaire has a high factor of maneuverability and cannot be spun other than off the top of a roll. According to the Paramount company, it comes out of the spin in less than one-eighth turn.

An aluminum gasoline tank with a capacity of fifty gallons is located in the wings. The fuselage is constructed entirely of steel tubing with a detachable engine mount. All welding in the construction of the Cabinaire is done on the jig. The cabin is equipped with wicker chairs provided with upholstered seats and of steel frame construction welded to the floor of the fuselage. There is a baggage compartment behind the rear seats. The windows are of non-shatterable glass. The Cabinaire is equipped with standard instruments. Landing gear is equipped with Oleo shock absorber struts, Bendix self-energizing waterproof brakes and a spring tail skid with patented revolving dural ball.

Specifications

Span (upper wing)	33 feet 2 inches
Span (lower wing)	29 feet
Wing area (upper)	173 square feet
Wing area (lower)	136 square feet
Length overall	24 feet 7 inches
Height overall	9 feet
Useful load	1,010 pounds
Gross weight loaded	2,630 pounds
High speed	120 miles per hour
Cruising speed	103 miles per hour
Landing speed	40 miles per hour
Climb	875 feet per minute
Cruising radius	400 miles
Take-off distance	441 feet



Four-place Cabinaire biplane with Whirlwind engine, produced by Paramount Aircraft Corporation

LIGHT AIRPLANES OF ENGLAND

By Paul E. Lamarche, Jr.

THE development of light planes in England within the past five years has attracted world-wide attention, and the activities of the British in this phase of aviation have unquestionably put them in the leadership in Europe among producers of light planes designed for private ownership and training purposes. Nowadays when English people quietly take off in their little two-seater light planes without any special preparations and fly from English fields to India, South Africa, Australia, China, or merely tour about the European Continent, it is simply taken as a matter of fact and regarded as a mere sporting venture. British light planes are used in perhaps more foreign countries than those produced in any other nation, and their reputation for reliability and all-around good performance has been well earned.

The story of this development is in itself an interesting one. Before the war, flying was a rather hazardous sport for the few and not taken too seriously by the general public. After the war, as in all countries, aviation in England saw a big let down in general interest. There were many who flew during the war who regarded flying as something that one does only during the period of hostilities, just as did artillerymen or machine gunners regard their howitzers or Lewis guns, but when peace returned, they no longer took an interest in those more bellicose occupations. It was during this general decline in activity that the Germans, whose aeronautical development was curtailed by the Treaty of Versailles, took to gliding and produced some excellent little sailplanes. These created much interest everywhere, but particularly in England. A glider contest which was then held at Itford Hill in 1922 caused many foresighted people to see possibilities in powering gliders with motorcycle motors or airplane motors of equivalent low power, and the idea of producing light planes with low maintenance expenses to appeal to the private owner began to bear fruit.

Accordingly, the *Daily Mail,* which has always taken a constructive interest in aviation, offered a prize of £1,000 to the winner of an international contest who could fly the greatest distance on one gallon of fuel, provided that the flight was not less than fifty miles. Later the Duke of Sutherland augmented this sum with £500 to go to the British pilots and machines, and several industrial organizations offered other prize money for planes powered with motors not in excess of 750 cc. piston displacement and for the winners of a speed contest over a twenty-five-mile circuit. A competition took place at Lympne in October of 1923 under the direction of the Royal Aero Club and proved to be a great success, largely because of the interest it created.

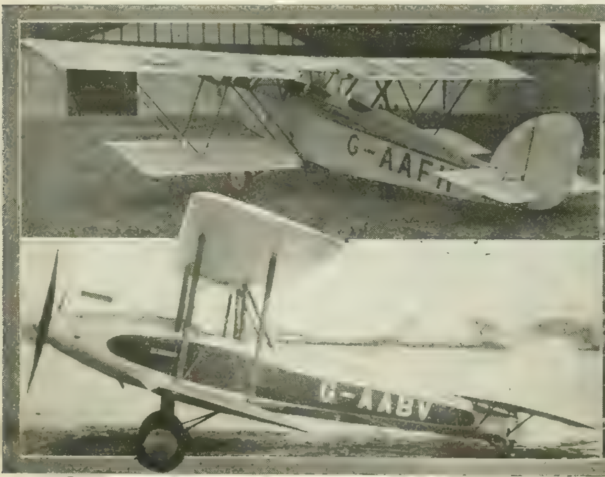
This interest led the British Air Ministry to put up prize money amounting to £3,000 —which was again added to by the Duke of Sutherland and others—for the development of a good two-seater light plane suitable for touring and training. During September and October of 1924, a competition was held under the direction of the Royal Aero Club of Lympne, which was won by a Beardmore "Wee Bee" monoplane powered with a Bristol Cherub engine, while a Bristol "Brownie" and a type known as the C(LA)3 designed by Comper also qualified.

These contests had induced many of the prominent aircraft manufacturers to design and produce some interesting light planes such as the Avro "Avis," a two-place biplane, the Gloster "Gannet," the Hawker "Cygnet," the Parnall "Pixie," the Westland "Wood Pigeon,' the Short "Cockle," a twin-engined light flying boat, and the Short "Satellite," a small monoplane with a Bristol Cherub 34-horsepower motor. The British Air Ministry then decided to finance six aero clubs supplying each with two D.H. "Moths" and a spare motor.

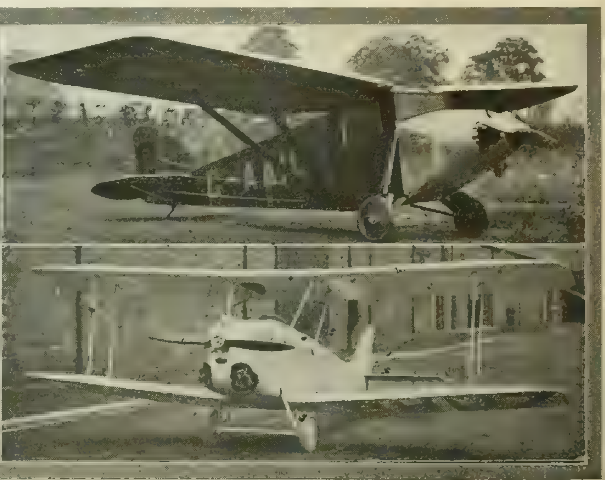
From this the development of the light plane activities has taken place and its interest is steadily increasing, especially this year with two members of the royal family owning light planes. In 1926 there were twenty-four privately owned planes in England. In 1929 there were 138, of which forty-three are owned by clubs. There are now in England twenty-one government-supported aero clubs and five private clubs. Those who benefit by subsidies receive varying sums from the Air Ministry, not exceeding £2,000 a year. In these clubs aided by the government there are at present 3,288 members, while new clubs and more memberships are being created regularly.

Most of the types designed around motors of low power that were built to specifications for the first light airplane competitions have become obsolete, and newer and better planes have been developed. Manufacturers soon learned that the public is willing to pay more for a good all-around plane with a motor of approximating 100 horsepower, and in numerous instances, have concentrated their efforts towards the production of planes following a standardized and conventional form of biplane of the heavier class of light planes. This past year, however, has seen a return on the part of several manufacturers to the light plane of low power, and their new models have shown many refinements over the older models. It is reasoned that there should be a plane on the market to appeal to every prospective flier's pocketbook. Some of these smaller planes have shown exceptional economical efficiencies as far as initial price, upkeep and low fuel consumption are concerned.

There are a number of planes described in this article which are in the heavier class of light planes, some of which have engines slightly in excess of 100 horsepower. The British are producing a number of biplanes which are of mixed construction, though there is a marked tendency towards metal frames nowadays. On most of these planes the Handley-Page slots are optional equipment, and in many cases, the landing gear is interchangeable



Parnall "Elf" (top) and Blackburn "Bluebird"



A.B.C. "Robin" (top) and Gloster "Gannet" biplane

Dousoutter sports coupe with Cirrus engine, warming up and in flight

floats or skis.

The British are fortunate in having been able to produce a number of reliable engines which have become known the world over. Of these the A. B. C. Scorpion and Hornet, the Cirrus Mark III and Hermes, the D.H Gipsy, and the Armstrong-Siddeley Genet and Genet-Major, are outstanding.

DeHavilland Moth

The DeHavilland Moth hardly needs an introduction, nor does the firm that builds it. The DeHavilland Aircraft Co., Ltd., is an old and well-established firm whose plant is located at the Stag Lane Aerodrome, not far from London, and whose war-time products are famous. Besides being engaged in the construction of aircraft, this firm produces the 100-horsepower Gipsy engine, a four-cylinder in-line air-cooled motor which, when completely equipped, weighs 285 pounds, and which is now being built in the United States by the Wright Aeronautical Corporation of Paterson, N. J. The Moth, which was first produced in England in 1924, is now being manufactured in the United States by the Moth Aircraft Corporation of Lowell, Mass. The DeHavilland company's output for 1925 was fourteen planes and in 1926 it was thirty-four. In 1927 they produced 117 planes and in 1928, during which time a new plant was built, production amounted to 336. Present production in 1929 is twenty planes a week. Besides record-breaking and long-distance flights in which this ubiquitous little plane has figured, including a recent flight from Sweden to Johannesburg, South Africa, the Moth has won the King's Cup in England three times and is the holder of two world's records for light planes of its category for altitude and speed. Apart from its use throughout the Empire, it is the choice of Britain's two flying princes, the Prince of Wales and Prince George.

The D.H. Moth open landplane is a tandem two-seater biplane with a fuselage of steel tube construction and wings of spruce longerons and plywood ribs, all of which is fabric covered except for the engine cowling. The wings can be easily and quickly folded, and when folded, have a span of nine feet ten inches. The fuselage contains two comfortable cockpits which are equipped with dual control. There is also a small baggage compartment built in behind the cockpits. The Gipsy engine is neatly faired in and all accessories can be quickly reached by removing the detachable cowling. The fuel tank is in the center section of the upper wing and has a capacity of nineteen gallons, sufficient to give the plane a range up to five hours at cruising speed.

Like a number of other English light planes, the Moth can be equipped with skis or pontoons in place of the ordinary landing gear. The tail skid is steerable on the landplane. The latest version of the Moth is the Coupé (described in the November issue of AERO DIGEST), which has a small stream-lined roof built over the cockpits with celluloid windows in the sides. The Coupé top can be attached to any Moth fuselage.

Specifications

Span	30 feet
Length overall	23 feet 11 inches
Span, wings folded	9 feet 10 inches
Height	8 feet 9½ inches
Weight empty	962 pounds
Gross weight loaded	1,750 pounds
High speed	103-105 miles per hour
Cruising speed	80 miles per hour
Range	320 miles
Absolute ceiling	18,000 feet

Avro Avian

No less well known than the Moth is the Avro Avian, which is now built in America by Whittelsey. The Avian is built by the A. V. Roe & Co., Ltd., of Manchester, which company has recently combined with Armstrong-Whitworth Aircraft, Ltd. This firm has in the past produced many well-known types and first built the Avian to take part in the Air Ministry's light airplane contest in 1925. The Avian has figured in a number of long-distance flights, among which were several from England to Australia, England to Tasmania, England to Capetown, and England to China.

A two-seater biplane with a fuselage of metal construction and wings of wood, the Avian is entirely fabric covered. The wings are easily folded, and when folded, the plane has a width of nine feet six inches. The fuel tank is in the center section of the upper wing and has a capacity of twenty gallons. The metal fuselage is of welded steel construction and contains two comfortable cockpits arranged in tandem, which are fitted with dual control. The Avian is usually powered with the Cirrus vertical air-cooled engine, which is produced in the States by American Cirrus Engines, Inc., but the plane recently has been adapted to carry the Armstrong-Siddeley Genet-Major air-cooled radial type.

Three-seater Simmonds Spartan

Specifications

Span	28 feet
Span, wings folded	9 feet 6 inches
Length overall	24 feet 3 inches
Track of landing gear	6 feet
Dihedral, lower wing	2½ degrees
High speed	97 miles per hour
Cruising speed	80 miles per hour
Take-off run	90 yards
Landing run	70 yards
Absolute ceiling	18,000 feet
Fuel capacity	20 gallons
Range	400 miles

Blackburn Bluebird

The Blackburn "Bluebird" is built by the Blackburn Aeroplane and Motor Co., Ltd., and sold through Auto Auctions, Ltd., of London. The Bluebird is a comparatively recent light plane to be introduced in England, but has been quick to prove its worth. Blackburn, in whose construction works the ship is built, designed his first plane as far back as 1909 and in 1911 built a military plane which met with favor from the government. From 1914 until the end of the war, he constructed war planes in a plant at Leeds. The present plant is located in East Yorks. One of these little planes, equipped with a Gipsy engine, was flown by Squadron Leader L. H. Slatter from England to South Africa.

The Bluebird is a biplane of metal construction, having a cockpit with two seats side by side and being equipped with dual control. It can be powered with a Cirrus Mark III engine or any of the other motors of equivalent power. The wings are built of drawn steel spars and duralumin ribs. When folded, they have a span of nine feet six inches. The stabilizer may be adjusted in the air. There is no fin and the rudder is balanced. The controls are of the push-pull type. The fuselage is constructed with steel tubes and metal plate joints, which form four detachable units; viz., the engine mounting, the center structure, rear fuselage and tail unit. The undercarriage is of the split-axle type and the plane is adaptable for use with floatation gear. The Bluebird Mark IV, the latest version, with a Cirrus Hermes engine of 105 horsepower sells for £730 or $3,650.

Specifications

Span	30 feet
Span, wings folded	9 feet 10 inches

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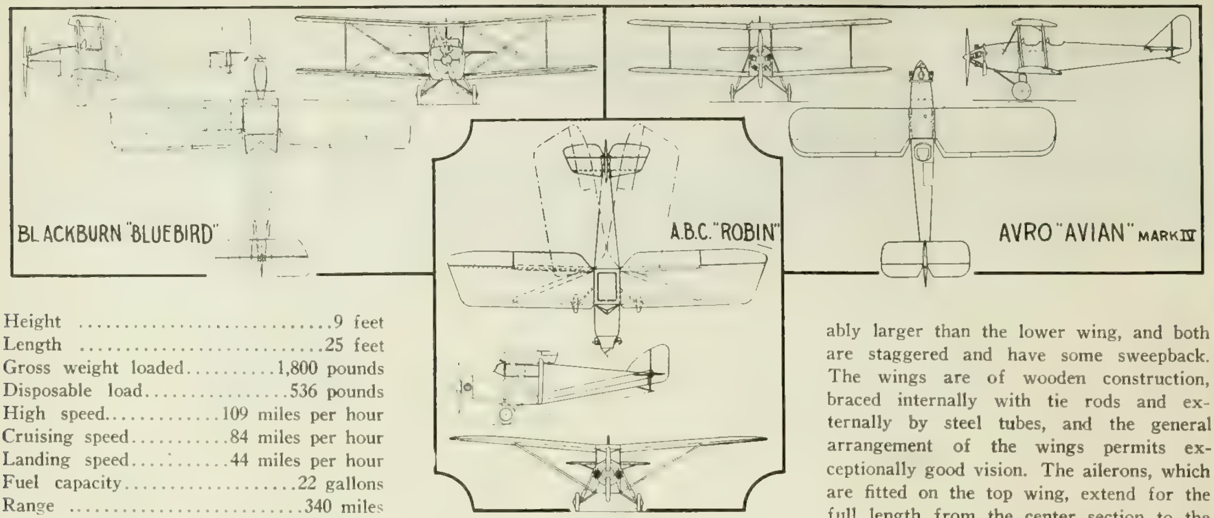


Height	9 feet
Length	25 feet
Gross weight loaded	1,800 pounds
Disposable load	536 pounds
High speed	109 miles per hour
Cruising speed	84 miles per hour
Landing speed	44 miles per hour
Fuel capacity	22 gallons
Range	340 miles
Ceiling	15,000 feet

Simmonds Spartan

The Simmonds "Spartan" is also comparatively new, having been introduced a little over a year ago by Simmonds Aircraft, Ltd., of Southampton. Mr. O. E. Simmonds, the organizer and technical director of the firm, has produced in this ship an interesting light plane that incorporates a number of innovations. He has built three planes evolved from the same type; i. e., the two-seater standard landplane, the coupé two-seater, and the three-seater, all of which are biplanes. In general construction they are the same, having fuselages of wood with a three-ply covering. The wings are of mixed construction, being of wood and steel, and carry a twenty-gallon fuel tank in the top center section of the wing. The most interesting feature of the various models of the Simmonds Spartan is the interchangeability of parts. All wing sets are identical, so that a single spare wing can be fitted to any desired position. The ailerons are likewise identical and interchangeable, as are also the two elevators and the rudder.

The Spartan is generally fitted with the Cirrus Mark III 90-horsepower engine which gives it a high speed of 100 miles per hour and a cruising speed of 85 miles per hour. On all Spartans access to the cockpits is by doors. In 1928, Spartan planes figured in several non-stop flights between London and Berlin, and Berlin and London with much success. The standard two-seater sells for £650, while the three-seater is sold for £735 and is equipped with the Hermes motor. These sums are equal to $3,250 and $3,675 respectively.

Specifications

Two-place light biplane with a Cirrus engine.

Span	28 feet 7 inches
Length	23 feet 11 inches
Height	9 feet 3 inches
Span wings folded	9 feet 5 inches
Wing area	240 square feet
Weight empty	930 pounds
High speed	100 miles per hour
Cruising speed	80-85 miles per hour
Stalling speed	40 miles per hour
Climb to 5,000 feet	10 minutes, 30 seconds
Take-off run	90 to 110 yards
Landing run	50 to 70 yards
Range	320 miles
Fuel consumption	16 miles per gallon

Parnall Elf

George Parnall & Co. of Yale achieved a reputation during the war for its design and production of military aircraft and has been interested in the development of light planes for a long time. In 1923 this firm designed and built a small low-wing monoplane known as the Parnall Pixie for the competition at Lympne. Its most recent type is the Parnall "Elf," a two-seater biplane powered with a Cirrus Hermes engine.

On the Elf the upper wing is considerably larger than the lower wing, and both are staggered and have some sweepback. The wings are of wooden construction, braced internally with tie rods and externally by steel tubes, and the general arrangement of the wings permits exceptionally good vision. The ailerons, which are fitted on the top wing, extend for the full length from the center section to the tips. On the lower wing, there are flaps resembling ailerons which are necessary to permit the wings to fold. When folded, the wings have a span of seven feet eleven inches, which is extremely narrow for a plane of this type. The fuselage is semi-monocoque and is of good construction with plywood covering. The roomy cockpits are arranged in tandem and both are placed behind the upper wing. The twenty-gallon fuel tank is placed in the fuselage behind the engine.

Westland "Widegeon" monoplane with Cirrus air-cooled engine

Specifications

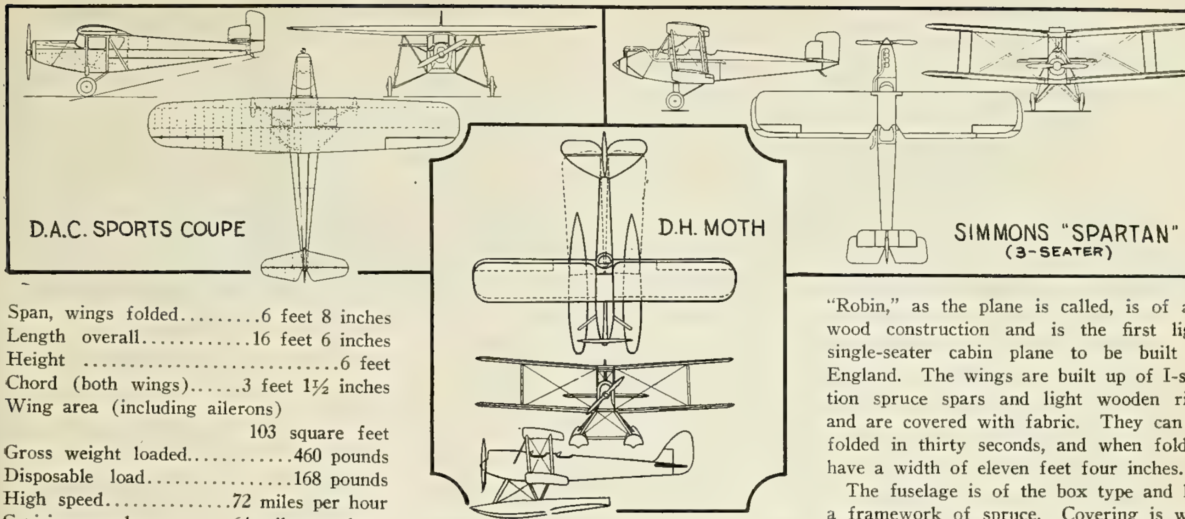
Span	31 feet 3½ inches
Span folded	7 feet 11 inches
Length	22 feet 10½ inches
Height	8 feet 6 inches
Track of landing gear	5 feet 6 inches
Weight empty	900 pounds
High speed, sea level	116 miles per hour
Speed at 5,000 feet	112 miles per hour
Cruising speed	103 miles per hour
Stalling speed	40 miles per hour
Climb to 10,000 feet	21 minutes
Ceiling	16,000 feet
Range	400 miles

Gloster Gannet

The Gloster "Gannet" is a diminutive one-place biplane that is in reality a survivor of the light plane competitions at Lympne in 1923. This little plane, with its wing span of eighteen feet and its unusual weight empty of 292 pounds, is built by the Gloster Aircraft Co., Ltd., of Cheltenham, which is among the leading aircraft builders in England and which is well known for its steel construction. The Gannet is a light sports plane powered with an inverted twin-cylinder Blackburn motor. The high-lift wings are arranged in the form of a single-bay biplane and are of wood construction covered with fabric. They are designed so that they can easily be folded by one man, and their span when folded is but six feet eight inches. Fuel is carried in the center section of the wing, and the tank has a capacity of two gallons. The fuselage is of conventional design and is of wood construction with fabric covering.

Specifications

Span	18 feet



Span, wings folded	6 feet 8 inches
Length overall	16 feet 6 inches
Height	6 feet
Chord (both wings)	3 feet 1½ inches
Wing area (including ailerons)	103 square feet
Gross weight loaded	460 pounds
Disposable load	168 pounds
High speed	72 miles per hour
Cruising speed	64 miles per hour
Landing speed	35 miles per hour

Desoutter Sports Coupé

The Desoutter three-seater cabin monoplane, which is built at Croydon Aerodrome, outside of London, by Desoutter Aircraft, Ltd., is a comparatively recent development. Mr. Marcel Desoutter, the managing director, is one of England's pioneer pilots and distinguished himself by his activities with Blériot monoplanes at Hendon in 1913 and 1914. A subsequent accident kept him, for a time, from participating any further in aeronautical activities. During that time he devised an artificial leg which, because of its lightness and durability, was adapted during the war, and he built up a considerable trade in this business with his brother, Charles Desoutter. He was, however, always interested in getting back into the aviation game so that not long ago he severed his connections with the artificial leg business and sought to connect with someone in the production of aircraft rather than spend large sums of money on experiments. As a result he took over the construction of the Koolhoven FK-41, with the world's right except for Holland, where they were first designed and built by Mr. Frederick Koolhoven, a noted aeronautical engineer who is as well known in England as on the Continent.

The Desoutter Sports Coupé is a semi-cantilever wing cabin monoplane of all-wood construction, plywood being used on all surfaces except for the engine cowling, which is metal. The high-lift wing is built in one piece and is supported by a system of outboard struts so that the fuselage is in reality suspended chiefly from points on the wing by the inclined struts, and although there is a connection directly over the fuselage, the wing is actually a parasol type. The fuselage is of semi-monocoque construction and contains a cabin with accommodations for three. The pilot is in front where he has before him a wide wind shield giving excellent visibility. A rip panel is placed in the roof of the cabin. There is a small baggage compartment in the upper part of the fuselage immediately behind the cabin. The landing gear is exceptionally wide, having a track of ten feet six inches. The tail arrangement is something of a departure from the ordinary, the object being to have the stabilizer and elevator clear of the slipstream. The tail skid is steerable. The Cirrus engine is mounted on a tubular structure and well cowled in. There are two fuel tanks in the wing, the total capacity of which is twenty-one gallons, sufficient to give the plane a range of five hours. Equipped with a Cirrus Mark III engine, the Desoutter sells for £750 or $3,750.

Specifications

Span	35 feet
Total wing area	180 square feet
Length	27 feet
Height	7 feet
Weight empty	980 pounds
Gross weight loaded	1,730 pounds
Fuel capacity	21 gallons
Landing gear track	10 feet 6 inches
High speed	101.5 miles per hour
Cruising speed	85-90 miles per hour
Landing speed	40-45 miles per hour

A. B. C. Robin

A. B. C. Motors, Ltd., of Walton-on-Thames, well known as the manufacturer of Scorpion and Hornet air-cooled motors, has recently put an interesting little single-seater high-wing cabin monoplane on the market, which because of its low initial cost and maintenance expenses should become popular among private owners. The "Robin," as the plane is called, is of all-wood construction and is the first light single-seater cabin plane to be built in England. The wings are built up of I-section spruce spars and light wooden ribs, and are covered with fabric. They can be folded in thirty seconds, and when folded, have a width of eleven feet four inches.

The fuselage is of the box type and has a framework of spruce. Covering is with plywood. A feature of the Robin is that everything is readily accessible, since the plane is built very low. No step is even necessary to enter the cabin through the door on the right side. Inasmuch as there are windows on all sides, as well as a skylight in the roof of the cabin, visibility is good. The side windows slide open. A small baggage compartment is included in the fuselage. The Robin is powered with an A. B. C. Scorpion motor that develops 34 horsepower at 2,300 revolutions per minute. The fuel consumption amounts to an average of forty miles to the gallon, which represents a halfpenny per mile at the prevailing price of gasoline in England. The fuel tank, which has a capacity of eight gallons, is placed in the fuselage and is large enough to give the plane a range of 340 miles. The Robin is sold through the National Flying Services, Ltd., the sole distributors, at a price of £395 or $1,975.

Specifications

Span	25 feet 4 inches
Span, wings folded	11 feet 4 inches
Length	17 feet 7 inches
Height	5 feet 9 inches
Chord	4 feet 6 inches
Wing loading	7 pounds per square foot
Weight empty	415 pounds
Gross weight loaded	680 pounds
High speed	105 miles per hour
Cruising speed	85 miles per hour
Landing speed	40 miles per hour

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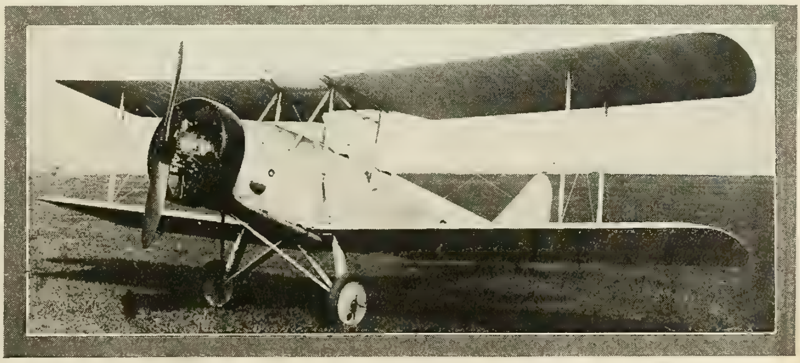

Avro Avian with Armstrong-Siddeley Genet Major motor

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Service ceiling	17,500 feet
Absolute ceiling	21,000 feet

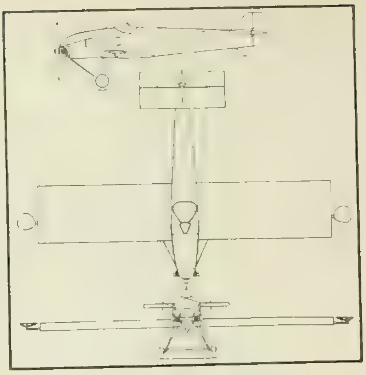
Comper Swift

Another little plane built around the A. B. C. Scorpion motor is the Comper "Swift," a single-seater parasol monoplane, which has just been placed on the market by the Comper Aircraft Company, whose plant is located at the Hooton Park Aerodrome, Cheshire. The plane has been designed as a fast light plane built at very low cost. Its top speed is 105 miles per hour and it is sold at a cost of £400 or approximately $2,000. Mr. Comper, who designed this little monoplane, has long been identified with the construction of light planes and is well known as the producer of the C(LA)-3 plane that participated in the competitions at Lympne. His latest model, known as the C(LA)-7, has exceptionally clean lines with a minimum of external struts and wires.

The wing structure consists of two I-section spars on which are built up the ribs, the whole being covered with fabric. The plane is braced from the top of the fuselage, and on either side, by a pair of V-struts extending to the bottom of the fuselage. The wings are folded by removing a pin at the front spar root and a second at the apex of the V-strut. With wings folded the plane has a width of seven feet six inches. The fuselage is of all-wood construction and is built in three separate sections; i. e., the engine section, central section and rear section including the tail. The structure is built in the form of a girder, with diagonal wooden struts being attached to the longeron by ply-plates. The cockpit is placed behind the wing and affords good visibility in all directions. The undercarriage, which is simple in construction, is of the divided-axle type. The shock absorbers are placed inside the fuselage so as to reduce resistance. The fuel tank, placed in the fuselage, is large enough to give the plane a range of 350 miles.

Specifications

Span	24 feet
Chord	4 feet
Wing area	90 square feet
Weight empty	331 pounds
Weight loaded	600 pounds
Power loading	6.66 pounds per square foot
High speed	105 miles per hour
Cruising speed	80-90 miles per hour
Landing speed	35 miles per hour
Climb	700 feet per minute
Fuel consumption	40 miles per gallon



Glenny & Henderson "Gadfly"

Glenny and Henderson Gadfly

Still another little single-seater light plane of low power which was introduced this year and which has been aptly called the "motorcycle of the air," is the "Gadfly," a low-wing monoplane built by Messrs. Glenny & Henderson in Byfleet. The Gadfly is of wood construction with all surfaces of plywood. The wing is of one piece and is fitted into a recess in the bottom of the fuselage, directly under the pilot's seat. The wing can be detached quickly by releasing four bolts. The wing is built up of spruce spars and plywood ribs. One of the most interesting features of this wing is the rotary aileron, which was invented two years ago by Captain Pearson, who is identified with this company. This aileron is in reality an auxiliary surface shaped somewhat like a heart, and is swivelled around an inclined pivot. In principle it puts the drag on the inside wing on turns and is reported to make the use of the rudder almost unnecessary, practically reducing flying to stick operation only. Normally the ailerons rest at an angle of approximately four degrees positive incidence and when the stick is moved to the limit one aileron increases this angle to about plus six degrees while the other decreases its angle to nearly minus forty degrees, creating a great amount of drag on the negative aileron.

The fuselage is of simple and inexpensive construction, having spruce longerons and struts. The undercarriage is of steel tubing equipped with shock absorbers. Fuel is carried in the nose and the total weight of gasoline and oil carried is eighty-two pounds. The Gadfly is powered with an A. B. C. Scorpion motor, has a top speed of 91 miles per hour, and cruises at 72 miles per hour. From the economical standpoint, the Gadfly is proving itself to be an excellent little plane. Its initial cost is £370 or $1,850. Its actual proved running expense averages five shillings per hour or three pennies per mile. In American currency this would represent $1.20 an hour or six cents per mile.

The Glenny and Henderson "Gadfly" has a speed of 91 m.p.h.

Specifications

Span	25 feet
Length	17 feet
Height	5 feet
Width with wing detached	7 feet
Wing chord	4 feet 9 inches
Wing area	108 square feet
Weight empty	455 pounds
Weight loaded	750 pounds
Disposable load	295 pounds
Wing loading	7 pounds per square foot
Power loading	18.62 pounds per horsepower
High speed	91 miles per hour
Cruising speed	72 miles per hour
Initial climb	500 feet per minute
Ceiling	13,000 feet
Range	350 miles

Boulton & Paul Phoenix

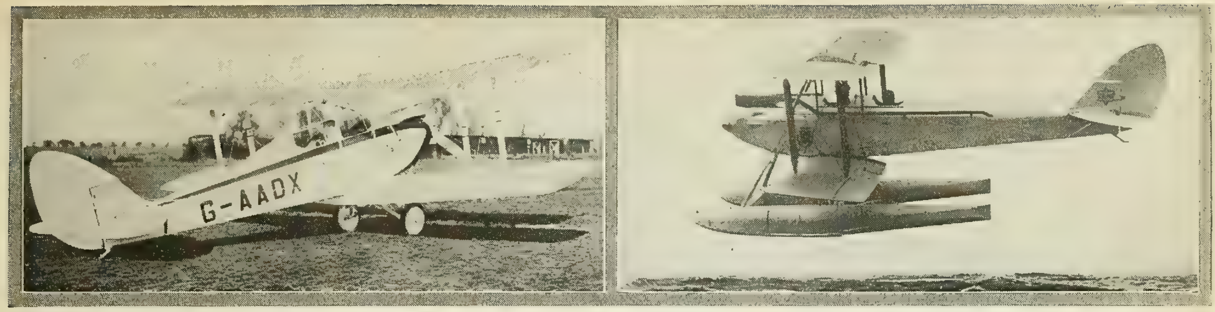
Another little monoplane built around the A. B. C. Scorpion engine is the "Phoenix," which is built by Boulton & Paul, Ltd., of Norwich, an important British aircraft plant which specializes in all-metal construction and which built much of the metal framework in the new British dirigible, the R-101. The Phoenix is a two-place parasol monoplane of simple and sturdy construction designed to sell at a low price. Not much is known about this little plane which so far has not been extensively exploited. It has a metal framework throughout and weighs 850 pounds empty. The wing, which is supported far back from the nose, can be folded. The tail assembly is somewhat differently arranged from the ordinary, in that the rudder is placed above the end of the fuselage and the elevator extends beyond the end of the fuselage, so that the rudder is in front of the elevator.

Specifications

Span	30 feet
Wing area	135 square feet
Weight loaded	850 pounds
High speed	87 miles per hour
Landing speed	40 miles per hour
Climb (sea level)	400 feet per minute

Westland Widgeon

The Westland Aircraft Works, which are a branch of Petters, Ltd., were founded in



De Havilland Gypsy Moth landplane with coupe top and the standard De Havilland Moth fitted as a seaplane

1915 for the construction of military aircraft and have their plant in Yeovil. Their "Wapiti," a general purpose two-seater military plane is well known and a new trimotor cabin monoplane, known as the Westland "Limousine," has just been introduced this year. Westland has been building the "Widgeon," a successful high-wing light monoplane, for several years, but is discontinuing production of this type and has offered the construction rights for sale, in order to concentrate on the production of the Limousine.

The Widgeon is a parasol monoplane of mixed construction, having wings of wood and fuselage, ailerons and tail units of metal. The latest of these is known as the Mark III-B, which differs from its predecessor in that it has a metal fuselage instead of one of wood construction. The wings can be folded, and when folded, have a span of eleven feet nine inches. The fuselage contains two cockpits in tandem with dual controls and a small baggage compartment behind them. The Widgeon is powered by a Cirrus engine and has a maximum speed of 104 miles per hour and a ceiling of 15,000 feet. The fuel tank, which is in the center section of the wing, has a capacity of twenty gallons, sufficient to give the plane a range of 3½ hours at normal cruising speed.

Specifications

Span	36 feet 4½ inches
Span, wings folded	11 feet 9 inches
Length	23 feet 5¼ inches
Height	8 feet
Chord	6 feet
Total wing area	200 square feet
Weight empty	935 pounds
Disposable payload	365 pounds
Gross weight loaded	1,650 pounds
High speed	104 miles per hour
Cruising speed	86 miles per hour
Service ceiling	15,000 feet
Climb (sea level)	600 feet per minute

Short Brothers Mussel

Short Brothers (Rochester & Bedford, Ltd.), of Rochester, made balloons as far back as 1897 and are probably one of the oldest firms in England to be interested actively in aeronautics. For some time they have specialized in the production of a number of well-known flying boats and seaplanes and it follows that their light plane production should be primarily intended for use over water. Short Brothers' most recent light plane, known as the "Mussel," is an all-metal low-wing seaplane that can be readily converted into a landplane. The Mussel can be fitted with a Cirrus Mark III or a D. H. Gipsy engine. The wings, which are semi-cantilever, are fabric covered, though construction is of duralumin, the spars being of pressed dural strip, having flanges of semi-circular section riveted to ribs of corrugated section. The wing is externally braced by two oblique struts extending from the top of the fuselage to a half-way point on the wing. The fuselage is of the monocoque type and is entirely covered with duralumin; the structural members are sections of the same material. The cockpits are arranged in tandem and dual control is provided. For use as a seaplane, the Mussel is provided with two floats of the standard Short metal type, being of duralumin construction. The land undercarriage is of the normal Vee type and built of stainless steel.

As a seaplane, the Mussel has a speed of 102 miles per hour and as a landplane, 105 miles per hour. Its range as a seaplane is 320 miles against 330 as a landplane. Empty, the seaplane weighs 1,061 pounds; the landplane weighs 931 pounds. The ship's cost as a seaplane is £1,100 or approximately $5,000, whereas the cost of the landplane is £975 or $4,875. Short Brothers also build floats and an amphibion gear for light planes of the Moth and Avian type. The amphibion arrangement consists of a large central float to which are attached two wheels which may be raised or lowered from the cockpit.

Specifications

	Seaplane	*Landplane*
Span	37 ft. 3 in.	37 ft. 3 in.
Length	25 ft.	24 ft. 6 in.
Height	11 ft. 9 in.	8 ft.
Chord	6 ft. 3 in.	6 ft. 3 in.
Weight empty	1,061 lbs.	931 lbs.
Gross weight	1,640 lbs.	1,510 lbs.
High speed	102 m.p.h.	105 m.p.h.
Landing speed	48 m.p.h.	46 m.p.h.
Climb	620 ft. a min.	690 ft. a min.
Endurance	3.5 hours	3.5 hours
Range	320 miles	330 miles
Take-off	17 seconds	......

Civilian Coupé

One of the newest aircraft manufacturing companies to be formed in England is the Civilian Aircraft Company of Burton-on-Trent, which has just recently completed and tested its first product, a two-seater coupé monoplane. This little monoplane, which is powered with an A. B. C. Hornet four-cylinder 75-horsepower motor, is a high-wing type of wood construction and has several interesting features. The wing structure consists of two box spars and a normal number of ribs, the whole being covered with plywood. The wings, which can be folded, are braced externally by a pair of V-struts on either side of the fuselage. The fuselage is of rectangular structure, being built of spruce longerons and covered with plywood. The cabin presents an innovation, in that it has windows on all sides, including the back. The cabin is built up to the wing which is a little higher than the aft part of the fuselage. Doors are on either side. All of the tail surfaces are cantilever and are covered with plywood. The undercarriage is of the divided-axle type. No performance figures are available at this writing, though dimensions are given:

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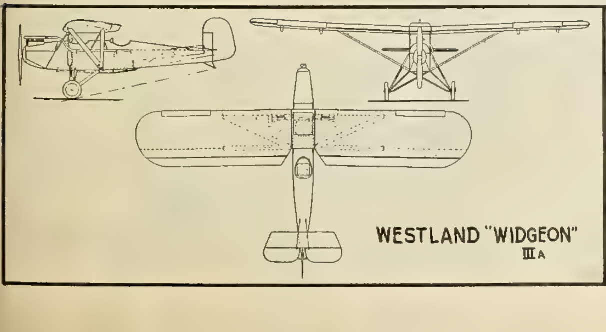
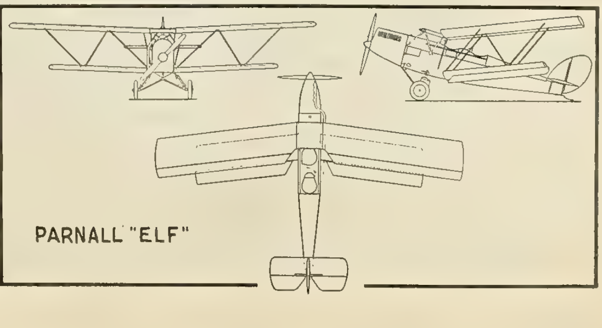


WESTLAND "WIDGEON" IIIA



PARNALL "ELF"

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Specifications

Span	35 feet 6 inches
Chord	5 feet
Length	19 feet 4 inches
Height	6 feet 3 inches
Wing area	167 square feet
Dihedral	3½ degrees
Width folded	11 feet 2 inches
Landing gear track	6 feet
Gross weight loaded	1,560 pounds

Surrey A. L. I. Biplane

A new biplane designed by Mr. J. Bewsher for the Surrey Flying Services has also just been completed and a short description may be given here. In general design, the Surrey A. L. I. Biplane, as it is called, follows the conventional lines of light British biplanes of the heavier type, though the fuselage is perhaps a little wider, giving the plane a somewhat short and squat appearance. The framework is of wood construction, spruce being used throughout, and all surfaces are fabric covered. The fuel tank is placed in the center section of the upper wing. The fuselage has a cockpit with side by side seating arrangement. This new light plane has been tested with the Salmson radial type air-cooled motor of French manufacture and the Cirrus vertical type air-cooled engine. With the former, it has shown exceptionally good performances, having developed a top speed of 110 miles per hour and reached a ceiling of 20,000 feet. It has a landing speed of 45 miles per hour and a cruising speed of 100 miles per hour. It is planned to place this new biplane in production shortly.

Specifications

Span	28 feet 9 inches
Length	20 feet
Height	8 feet 6 inches
Wing area	215 square feet
Weight empty	680 pounds
Weight loaded	1,200 pounds
High speed	110 miles per hour
Landing speed	45 miles per hour
Cruising speed	100 miles per hour
Ceiling	20,000 feet
Range	200 miles

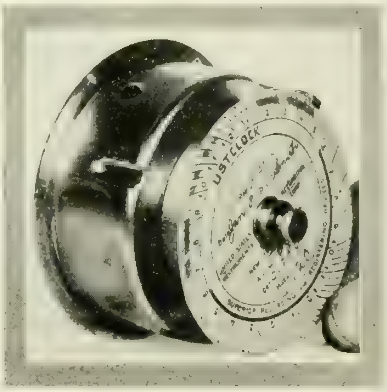
PILOT'S LOG KEPT AUTOMATICALLY BY RECORDING CLOCK

THE Ust-Clock, manufactured by the U. S. Fare Recording Company of New York City, is a time mechanism which records on a chart the working time and the idling time of an airplane during a period of twenty-four hours. The clock is designed to register on the chart the number of flying hours and the time of day in which they occurred, as well as the number of hours the plane spent on the ground during the twenty-four-hour period. This includes taxying, standing with the engine idle, or standing with the engine off, or being trundled about in the hangar, etc.

The apparatus consists of an eight-day clock with a rear attachment which holds the chart when it is inserted for recording.

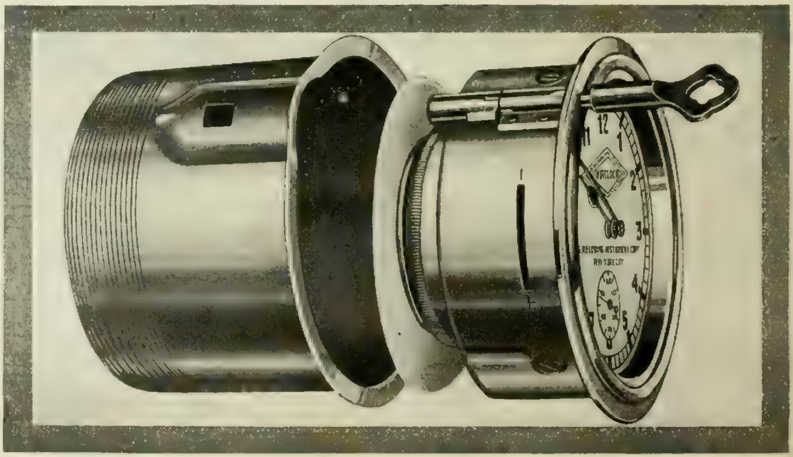
The chart is a chemically-treated paper disk which is ruled off into divisions representing the twenty-four hours of the day. There is a precisely balanced needle which registers the slightest movement of the plane by scratching off the surface coating of the chart, leaving exposed the under part of the disk which takes the form of a mark. This mark is recorded heavily when the plane is in flight, lighter if the engine is idling with the plane on the ground, and still lighter if the plane is moved about the hangar or field.

The disk is automatically cut slightly on the edge when it is inserted and withdrawn. These cuts indicate whether or not the chart has been withdrawn or inserted during the twenty-four-hour period, and thus prevents tampering and interfering with a true recording.



Dial at rear of recording clock

The mechanism has no driving apparatus other than the works of the clock and may be installed like an ordinary clock into the airplane instrument board.



Recording clock for airplane use and the casing in which it is mounted

BI-METAL BEARING

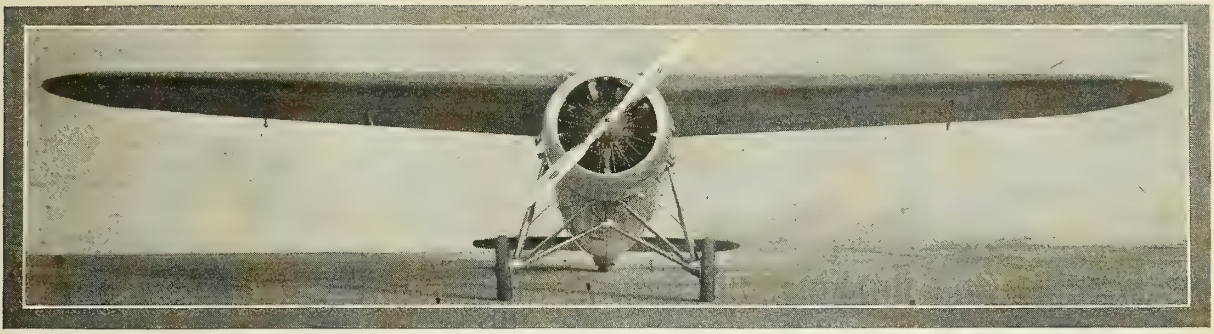
ENGINEERS of the Fredericksen Company, manufacturers of bearing metal, in Saginaw, Michigan, have developed a new type of bi-metal bearing which is said to possess several interesting advantages.

The Fredericksen Company has for a number of years been manufacturing a bearing bronze sold under the trade name of Sabeco. Sabeco, as described by an official of the company, is composed of virgin copper, tin, and lead—with a high percentage of lead alloyed by a secret process which prevents segregation of the lead as well as seizing, scoring, burning, corrosion, pounding out, and many of the other evils associated more or less with bronze bearings. The cost of manufacture under the secret process, however, has precluded its use in many instances where its advantages were desirable.

Experiments to overcome this condition were responsible for the new bearing material which is to be known as Sabeco-Ed Steel Bearings. It consists of an outer shell of seamless steel tubing to which an inner lining of Sabeco bearing bronze is fused. Tests of the fusion of the metals have been made by bringing the entire bearing to the melting point of the bronze, allowing it to run out. Examination after cooling showed a film of the bronze adhering to the steel. Further proof of this fusion is shown in machining, there being no separation of the metals in the chips.

In process of manufacture, the bearing is deposited on the steel shell by centrifugal force while the temperature of both metals is at the melting point of the former. This process, in addition to bringing about fusion of the two metals, produces a uniform inner shell of the bearing material, which is easily reamed to the desired size.

Another claim for the new bearing material is that it possesses a lower coefficient of expansion. Since the coefficient of expansion of bronze is much higher than that of steel, and the thickness of the bronze shell is only about one-third the thickness of the bearing wall, the coefficient of expansion is only a fraction over a third of the all-bronze bushing.



CONSOLIDATED FLEETSTER

A NEW commercial monoplane which is reported to have attained a speed in excess of 190 miles per hour was recently completed and test flown by the Consolidated Aircraft Corporation of Buffalo. The Fleetster, as this eight-place ship is called, is powered with a series B Pratt and Whitney Hornet engine delivering 525 horsepower. With the completion of flight tests at Buffalo, the plane was to be taken on a transcontinental demonstration and reliability tour.

According to Consolidated officials, the Fleetster, during its initial test flights, took off in twelve seconds and climbed to an altitude of 10,000 feet in twelve minutes.

The entire design is predicated on a special monocoque construction developed and patented by Lawrence D. Bell, general manager of 'the Consolidated company. It is built of aluminum alloy, the overall shape being perfectly streamlined. The exterior is smooth with the exception of a moulding which borders each section of plate. The fuselage is practically circular in cross section.

The engine mount is constructed of aluminum alloy sheet, and extruded members arranged in conical form tying the mounting ring directly to the outside fuselage shell. The mount serves as the rear boundary for the N. A. C. A. cowl. The engine proper is mounted in rubber in order to reduce vibration transmitted to the cabin structure. The N. A. C. A. cowling hood is built in three pieces and anchored to the structure in such a way that the entire cowl may be removed in less than five minutes.

The seating arrangement consists of the regular pilot's seat and auxiliary seat in the pilot's compartment. In the main cabin there are two seats facing each other, each accommodating three persons. The cabin is upholstered throughout. All of the cushions are down-filled and the individual seat cushions are removable. An alternate arrangement of the cabin consists of six individual seats, three on each side of the aisle, the door being moved aft of the rear seat.

The Fleetster wing, which is a full-cantilever type, is constructed of laminated plywood, built in one piece with internal braces. The tail surfaces are constructed of aluminum alloy and covered with the same material. The fin is built integral with the fuselage and is well faired in to reduce resistance. Stabilizer and elevator are braced to the fin by a single streamline tube. There is no other external bracing on the tail units. The stabilizer is adjustable in flight through a range of plus or minus three degrees.

The landing gear is of the split-axle type and consists of two sets of three struts each; one of which, the shock-absorber strut, is attached to the fuselage just forward of and slightly below the first window of the passenger cabin, and the other two of which join the fuselage on its under side. Wheel brakes and a tail wheel are fitted, the latter being almost completely covered by a semi-streamline housing.

The monocoque construction of the Fleetster was announced soon after the National Advisory Council for Aeronautics had developed the N. A. C. A. cowling and is one of the few planes thus far built in which the cowling has been used to obtain one hundred per cent efficiency. The new type cowling adds between fifteen and twenty miles an hour to the speed of the plane.

The span of the wing is 45 feet and the length overall 31 feet.

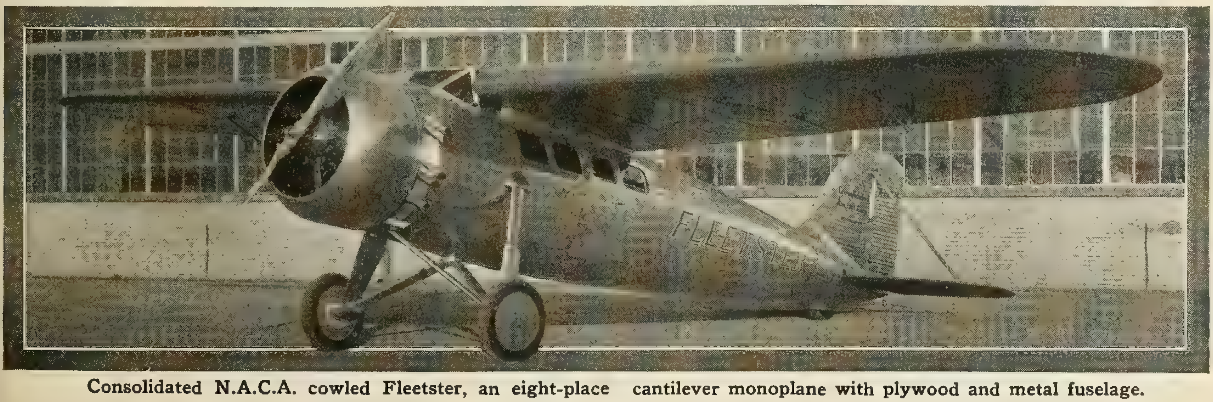
SCREW THREAD TABLE

THE Bureau of Standards, U. S. Department of Commerce, has issued a pamphlet entitled "American National Screw Thread Tables for Shop Use," which makes available for convenient use six of the most essential tables of dimensions of fastening screws as published in the 1928 Report of the National Screw Thread Commission. These tables cover the basic sizes, limiting dimensions, tolerances, and tap-drill sizes for the American National coarse and fine thread series.

NEW LAMINATED GLASS PRODUCED

THE Duplate Corporation has added two more laminated glasses to its former line—Duo-lite, a laminated window glass, and Aero-lite, a laminated photo glass, are the newcomers. Laminated sheet glass, because of its light weight, is especially suited for aircraft use. Duo-lite is 3-16 inch thick and Aero-lite is ⅛ inch thick.

These two glasses are said to be exceptionally free from distortion because a new process sheet glass is used together with the Creighton process of laminating. The Pittsburgh sheet glass used is a recent development in window glass manufacture.



Consolidated N.A.C.A. cowled Fleetster, an eight-place cantilever monoplane with plywood and metal fuselage.

SALMSON 40 HORSEPOWER ENGINE

SEVERAL types of air-cooled and water-cooled engines are produced by the Salmson company (Société des Moteurs Salmson) at Billancourt, France. These types range from 12 horsepower to 500 horsepower. The type 9 AD of 40 horsepower is one of the most popular and is to be produced in England soon. It is especially suited for light single-seater and two-place sport planes.

The aluminum alloy crankcase of the 9 AD is of the split type, ribbed externally and internally. The rear half of the crankcase carries pumps, magneto, gas distribution, etc.; in the front half the valve gear is housed. The auxiliary drives are all at the back of the engine.

An unusual feature of the Salmson cylinder construction is that the aluminum head, which extends a considerable distance down the steel barrel, is neither screwed, shrunk nor bolted on; it would appear that the head must be cast on in situ, using the steel barrel itself as the core.

The steel cylinder is of the closed-end type, the valve seatings being formed integral with the cylinder, while the inlet and exhaust casings are of steel, welded to the cylinder head. The aluminum jacket is nowhere in direct contact with the gases, nor do any of the stresses fall upon it. The lower part of the cylinder barrel has cooling fins formed upon it, and towards the bottom it has a flange supporting it on the crankcase to which it is attached by four bolts. With this arrangement individual cylinders can be dismantled without interfering with the others.

There are two valves per cylinder, one inlet and one exhaust, and one sparking plug per cylinder. The valves are operated by push rods and rockers, the rocker supports being attached to the steel cylinder head and not to the aluminum portion. The valves are retained on their seatings by the double-wire hairpin springs which have become typical of all Salmson aero engines.

The pistons are of aluminum alloy with flat crowns and internal ribbing. There are three piston rings to each cylinder, one of which is a scraper ring. The gudgeon pin floats in the piston bosses.

The connecting rod assembly is of the type in which there is a balanced master connecting rod and eight auxiliary rods. The rods are of steel and of tubular cross section. The wrist pins are fixed in the big end of the master rod.

The crankshaft, of chrome nickel steel, is in two pieces, the forward web and crank pin being integral with the front part. Balance weights are provided opposite the crank pin. The crankshaft is carried in three roller bearings; one near the extreme front end, one in front of the crank throw, and one at the back.

A single cam ring, integral with which are the inlet and exhaust cams, is mounted inside the forward part of the crankcase. Driven by planet gears in the same direction as the crankshaft, it revolves at one-tenth crankshaft speed. There are five cams in each row. The push rods are actuated from the cams via tappets working in guides in the crankcase. The cam assembly and thrust races are closed by the cover bolted to the front of the crankcase.

Lubrication is the usual dry-pump type, with two gear oil pumps mounted on the back of the engine, one a pressure pump and the other a scavenge pump. From the tank the oil enters the hollow rear end of the crankshaft through a filter and is delivered under pressure to the hollow crankpin. Through passages in the pin it enters the big end of the master connecting rod and is led through the hollow connecting rods to the gudgeon pins. The valve timing gear is lubricated by splash. Excess oil delivered to the gudgeon pins, pistons, etc., is removed from the cylinder walls by the scraper rings and ultimately collects in the bottom of the crankcase, where it drains into a filter and is removed by the scavenge pump and returned to the tank by way of an oil cooler.

The rocker fulcrum pins are of fairly large diameter and are hollow so as to form small reservoirs for the lubricant. A special pump is supplied with the engine for filling these pins before each flight.

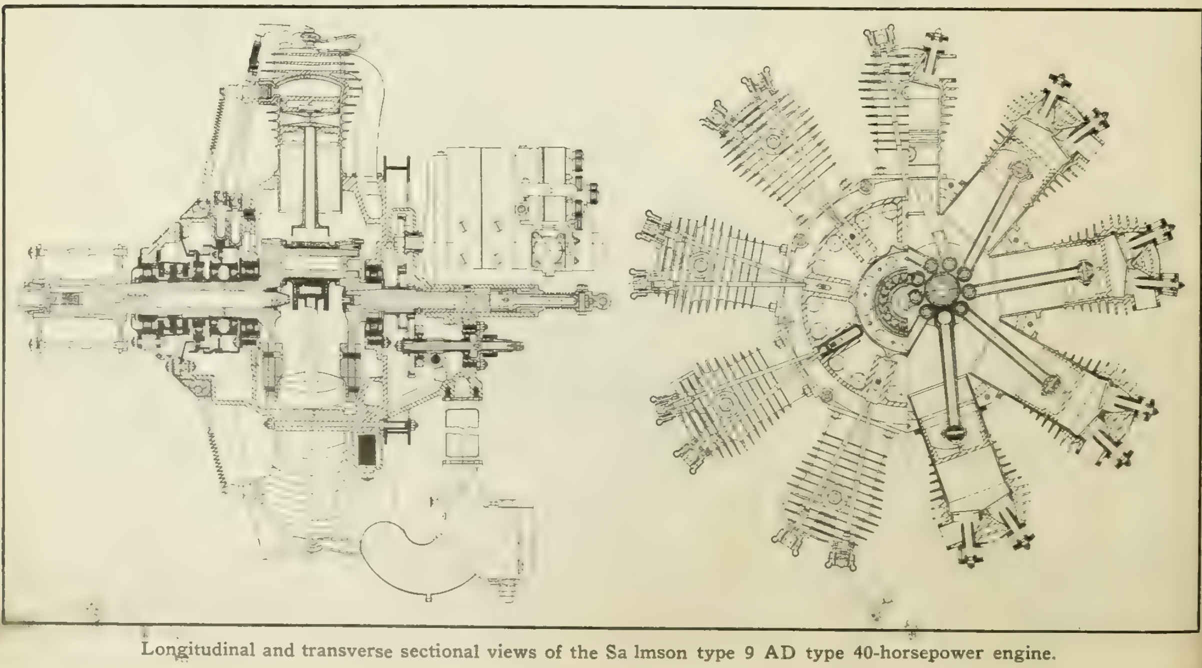
The mixture supplied by a Zenith type 26 D. K. I. carburetor is led to the collector on the back of the crankcase, whence it is distributed to the individual cylinders via induction pipes placed behind the cylinders. The oil being returned to the tank by the scavenge pump is led through a chamber surrounding the pipe from the carburetor to the collector, and is thus partly cooled while at the same time slightly pre-heating the mixture from the carburetor.

Ignition is by a Salmson type G. G. 9 magneto. This magneto produces four sparks per revolution, and is therefore geared to the crankshaft in the ratio 9 to 8. Looking at the engine from in front of a tractor machine, the lower cylinder on the starboard side is numbered 1, and the order of firing is 1-3-5-7-9-2-4-6-8.

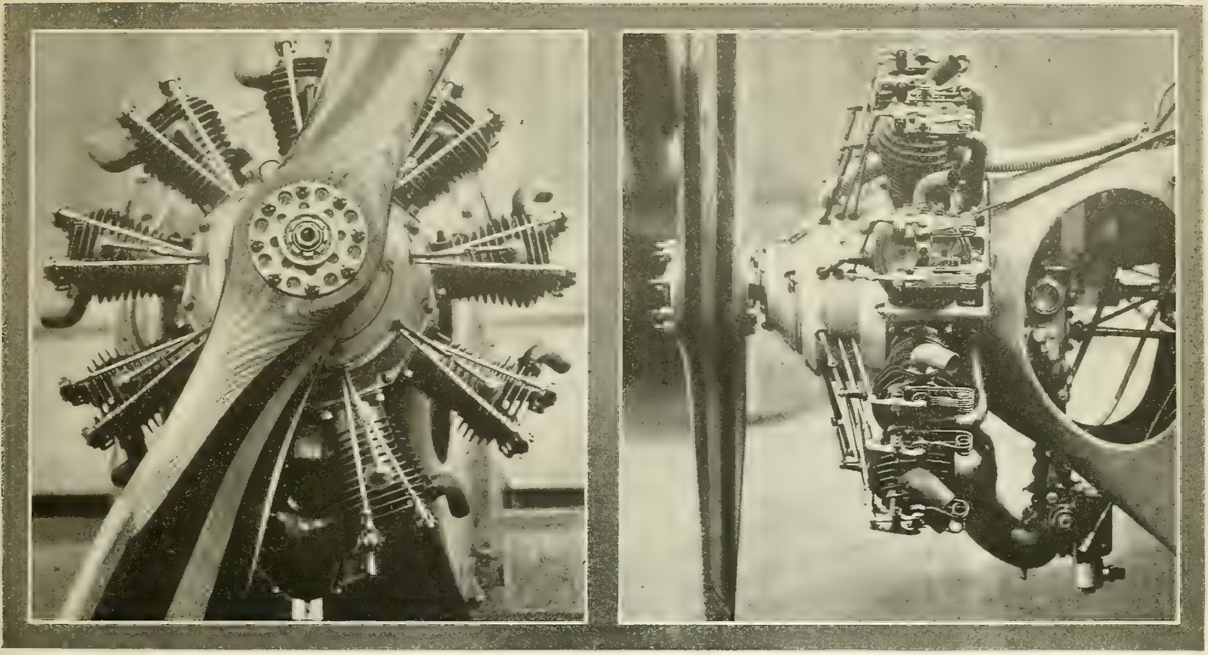
A hand cranking gear is provided on the back of the engine.

Principal specifications of the nine-cylinder Salmson AD 9 are:

Bore	2.75 inches
Swept volume	179.5 cubic inches



Longitudinal and transverse sectional views of the Salmson type 9 AD type 40-horsepower engine.



Front and side views of the Salmson 9 AD as installed in an Aeromarine-Klemm monoplane.

Compression ratio ....5.6 to 1
Nominal power.....40 b.h.p. at 2,000 r.p.m.
Average fuel consumption..0.55 lb. per h.p./hr.
Average oil consumption..0.05 lb. per h.p./hr.
Weight with propeller hub......154 pounds

AMENDMENTS TO AIR COMMERCE REGULATIONS

According to a recent notice from the Aeronautic's Branch, Department of Commerce, Section 17 of Aeronautics Bulletin No. 7-A, Airworthiness Requirements of Air Commerce Regulations, effective July 1, 1929, is deleted; and the following, effective December 1, 1929, is substituted:

17. *Control System*—Control systems shall be capable of carrying loads corresponding to 125 per cent of the design loads specified for control surfaces except that when the resulting load on control column or rudder pedal is less than the minimum noted below, the latter value shall be used. If the necessary force on the control column or rudder pedal exceeds the maximum noted below, the latter value may be used.

A. *For elevator loads,* a minimum of 200 pounds and a maximum of 350 pounds applied at the grip on the control stick, or forces of half these values applied at two diametrically opposite points on the rim of a control wheel and acting in a fore and aft direction.

B. *For aileron loads,* a minimum of seventy-five (75) pounds and a maximum of 125 pounds applied at the grip of a control stick or a couple equal to the product of the diameter of a control wheel and a minimum force of seventy-five (75) pounds or a maximum force of 125 pounds.

C. *For rudder loads,* a minimum force of 200 pounds and a maximum force of 350 pounds applied at the point of contact of the pilot's foot.

The strength of control systems must be demonstrated by static tests in which the full design load is applied. During such tests the controls will be operated from the cockpit with twenty-five (25) per cent of the design load on the surfaces to ascertain the absence of excessive friction, jamming, and deflection.

The forces in the control wires or push rods operating the movable surfaces must be computed and their effect on the rest of the structure investigated and allowed for in the design of the structure. Special care must be taken to make sure that the portion of the wing between the rear spar and the aileron is strong enough to carry the load for which the aileron is designed, and the structural members in this part of the wing shall be analyzed in the aileron analysis.

IMPROVED CABLE END

Improved aircraft control cables and terminals, which are said to have longer life, have been developed by the American Cable Company. Both Tru-Lay cable and Tru-Loc fittings, the elements composing these control lines, have been used in automotive and other lines, so that their application to aircraft is new only in being a recent adaptation.

The distinctive feature of Tru-Lay cable is the preforming of the individual wires and strands before being laid in the cable so as to relieve the initial strain. This preforming is thought to be responsible for the long life of the cable. During the past year the Army Air Corps at Wright Field, Dayton, Ohio, has conducted tests in which the cable was subjected to actual service conditions in an airplane and later to laboratory tests in a special testing machine along with similar samples of ordinary cable.

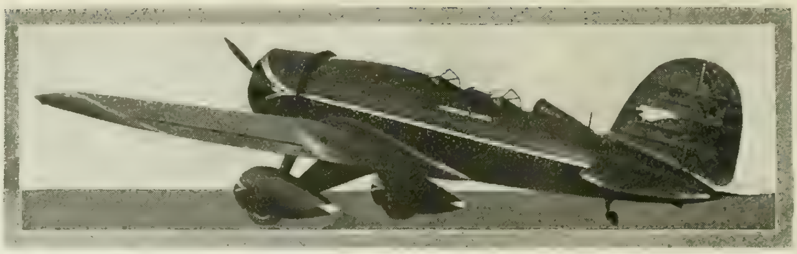
The laboratory tests were made in a special machine in which the cables, each carrying the same load, were oscillated in a reverse bend over pulleys until they showed several broken wires; they were then tested for tensile strength, with results as follows:

Both were ⅛-inch diameter 7x19 aircraft cables. The original tensile strength of the Tru-Lay cable was 2,188 pounds; that of the ordinary type, 2,494 pounds. The ordinary cable withstood something over 600,000 reversals under the applied load and had lost 77 per cent of its strength; the preformed cable tested under exactly the same conditions withstood over 12,000,000 reversals and had lost 25 per cent of its strength.

The Tru-Loc fittings consists of a steel sleeve bored to permit the cable to extend through the entire length of the fitting and, while in that position, to be processed by a patented method. The steel used may be either 1025 or chrome-molybdenum. The processing causes the metal of the sleeve to flow, cold, down into the interstices of the rope lay cable, at the same time compressing the cable in such a way as to form, for all practical purposes, a solid mass.

A series of tensile strength tests to destruction were recently made on several two-foot assemblies by the Daniel Guggenheim School of Aeronautics at New York University. The cable was ⅛-inch diameter 7x19 Tru-Lay tinned aircraft cable rated at 2,000 pounds. The fittings consisted of a threaded Tru-Loc sleeve on one end and a Tru-Loc eye on the other end, both designed to work with standard A. N. fittings. In every case, the fittings developed the full strength of the cable; most of these cables had breaking points above 2,100 pounds.

LOCKHEED "SIRIUS" MONOPLANE



The Lockheed "Sirius" is a two-place high speed sport plane

THE first of a new series of Lockheed planes, known as the Lockheed "Sirius," and named after one of the brightest stars in the firmament, is to go to Colonel Charles A. Lindbergh. Edward S. Evans, president of Detroit Aircraft Corporation, has announced that the Lockheed division will add the Lockheed Sirius type of plane to its regular line of models. Inasmuch as the various Lockheed models are named after stars, the name Sirius was selected as appropriate for the new type of plane.

First test flights of the Lockheed Sirius were made at the United Aircraft field near the Lockheed factory. Although no tests were run over a measured course, the Sirius is reported to have proved exceptionally fast, was highly maneuverable, showed good stability and landed at low speeds.

The Department of Commerce has paid tribute to Colonel Lindbergh's famed ship, the *Spirit of St. Louis*, in granting of the license of the new plane. It will be remembered that "WE" bore the identification NX-211 and the new ship will be known on Government records as NR-211. The change in the prefix on the number from X to R is due to new government regulations and will permit operation of the plane in countries outside of the United States.

In its coloring Colonel Lindbergh's new ship is quite distinctive. The entire fuselage is black and has a wide gold stripe on the mid-section of each side and extending the entire length of the body. The wings, extending from the lower side of the fuselage, are painted orange-red, as are the control surfaces on the tail.

The streamline of the new ship has been especially well worked out. The engine is completely enclosed in a cowling of the type originated by the National Advisory Committee for Aeronautics. It is estimated that this cowling increases the speed of the plane fifteen miles per hour. Although the cowling fits closely over the engine and the nose of the plane, ample provision has been made for cooling. The Pratt & Whitney Wasp engine on the Lockheed Sirius develops 425 horsepower at 2,000 revolutions per minute.

The streamline effect is carried on throughout the fuselage from the engine back to the control surfaces. The ship embodies the Lockheed type of monocoque construction, resulting in freedom from external bracing to the wings, which would greatly hamper the streamline effect. Special low type wind-shields also have been fitted.

The two cockpits are located well in the rear. Both are equipped with complete controls, and the forward place has a number of special instruments. The two places are spacious and comfortable.

In the landing gear is found further evidence of streamline effect. New Lockheed hydraulic shock-absorber struts are used in this construction. The wheels are almost entirely encased in a special streamline housing known as "Pants."

The wings of the plane are of low-wing cantilever construction. The mean chord is eighty-two inches and the wing area is 265 square feet.

Tanks for 320 gallons of gasoline are built in the forward part of the fuselage and an additional 120 gallons are carried in the wings. The oil tanks have a capacity of 28 gallons.

The Lockheed Sirius was primarily designed as a two-place sport plane of high performance. For average service it would carry two persons and their baggage with 150 gallons of gasoline over a range of approximately 1,100 miles. For Colonel Lindbergh's use, however, the extra gas tanks were installed, bringing the total capacity up to 440 gallons of fuel and increasing the range to 3,300 miles. This arrangement was specified by Colonel Lindbergh so that he may make extended flights without the long delays caused by landings for gasoline.

With the 3,300-mile range as desired by Colonel Lindbergh, there is a considerable increase in the gross weight, a condition which the Sirius was designed to meet. With tanks for 440 gallons of gasoline, the plane weighs 2,950 pounds. Gasoline weighs 2,640 pounds, and the twenty-eight gallons of oil, 210 pounds. Each person and equipment is allotted 200 pounds, and another 100 pounds is estimated for baggage. This results in a gross weight of 6,200 pounds, with the plane fully loaded for a flight of 3,300 miles.

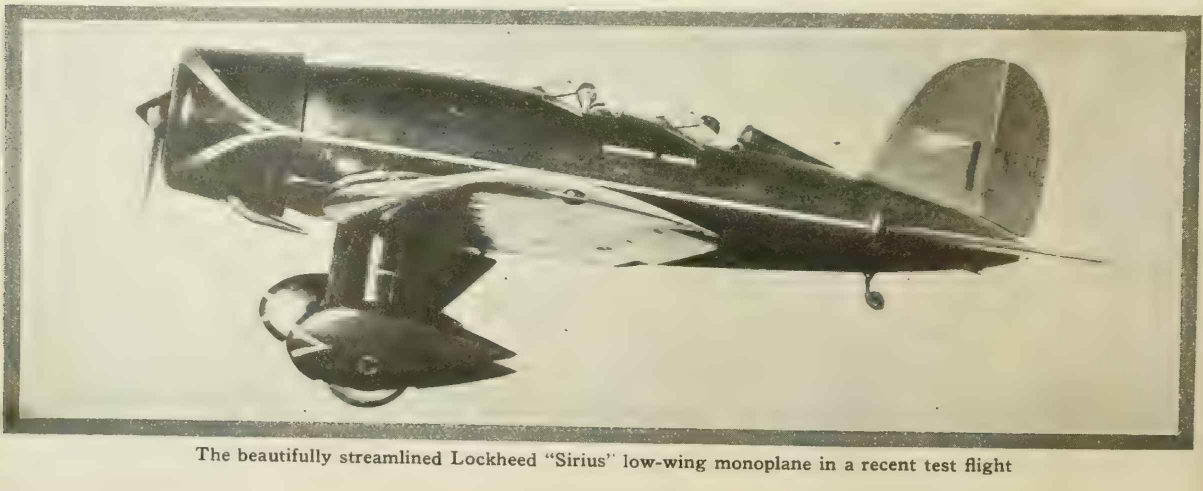
Weights given below are for a standard production Sirius with a fuel capacity of 150 gallons and an oil capacity of twelve gallons.

SPECIFICATIONS

Span	42 feet 10 inches
Chord (mean)	82 inches
Wing area	265 square feet
Length overall	27 feet 6 inches
Normal fuel capacity	150 gallons
Normal oil capacity	12 gallons
Normal cruising radius	1,100 miles

Weights

Weight empty	2,950 pounds
Payload	500 pounds
Disposable load	1,450 pounds
Gross weight loaded	4,400 pounds



The beautifully streamlined Lockheed "Sirius" low-wing monoplane in a recent test flight

CARDINAL "SENIOR"

THE Cardinal Senior is a two-place high-wing cabin monoplane powered with a LeBlond 90-horsepower engine and manufactured under Approved Type Certificate No. 264 issued by the Department of Commerce to the St. Louis Aircraft Corporation of St. Louis, Mo., a subsidiary of the St. Louis Car Company. The ship is designed for usage as a student training plane, or for business and pleasure flights.

The Cardinal Senior takes off in about five seconds in a dead calm, has a cruising speed of over 100 miles per hour and climbs, fully loaded, 950 feet per minute. The wings are wired for navigation lights and tubed for air speed indicator. Spars are routed and of solid spruce, and extend the full length of the wing, with a 12 to 1 splice at the center section. Ribs are of basswood and spruce webbing reinforced with three-ply birch veneer and spruce cap tips. There are six compression members, each of which is constructed of two ⅝ by .025 steel tubes top and bottom and one ½ by .035 centers. These tubes are welded to end plates and wire terminals, and the entire assembly is bolted top and bottom through the plates to the spars. Macwhyte Army and Navy specifications drag wire is used for tie rods. Grade A Flightex with four coats of clear and two coats of pigmented dope covers the wing.

The gasoline tanks are located between the spars in the wing on either side of the fuselage and have a total capacity of twenty-five gallons. There is also a two and one-half gallon reserve tank built into the leading edge of the center section.

The fuselage is of chrome-molybdenum and carbon steel tubing. The interior of all tubes is oil-treated to prevent corrosion, and construction is of the Warren truss type. The engine mount is of welded steel tubing and is bolted to the fuselage at four points with 5/16-inch nickel steel bolts in such a manner that it is possible to swing out the entire engine assembly for inspection and adjustment. An aluminum cowling covers the fuselage on top and on the sides aft to the door of the cabin. The bottom of the fuselage is aluminum-covered aft to the rear point of the cabin. The remainder of the fuselage is covered with Grade A Flightex covered with six coats of dope.

The landing gear is the split-axle type of chrome-molybdenum steel, with Oildraulic shock struts. The suspension of the landing gear is designed to dissipate landing impact through three points located at the top, bottom and center of the fuselage. Wheels are streamlined, and are 24 by 4 inches. The ship may be fitted with a tail wheel 6 by 2½ inches, or a skid, as standard equipment. The ship is equipped with brakes designed by engineers of the St. Louis Aircraft Corporation.

The ailerons, elevators and stabilizer are rod-controlled and are of welded 1025 carbon steel tubing. The stabilizer is adjustable from one degree positive to four degrees negative and is designed to permit the pilot to fly hands off at all engine speeds. A 1½-inch by .035 steel tube runs through the full length of the ailerons and on to the center section aft of the rear spar from which point it is moved by push and pull rods from the control stick in the cabin. Dual controls are provided and individual sticks and rudder pedals are quickly removable. The throttle control is located in the center of the instrument panel. The brake controls are located above the left set of rudder pedals.

Standard equipment includes a Type A Consolidated instrument panel with altimeter, tachometer, oil pressure and oil temperature gauges. A compass is installed on the back of the front center section spar and a gasoline gauge is located below the gasoline tank in the left wing. The cabin is equipped with a 35-inch air cushioned seat and has 37 inches of head room. The interior of the cabin is finished in brown Spanish leather. Visibility is provided by a pyralin center section and triplex cabin windows.

Specifications

Wing span	32 feet 4 inches
Chord	5 feet
Wing area (incl. ailerons)	160 square feet
Length overall	21 feet 3 inches
Height overall	7 feet
Aileron area	15 square feet
Elevator area	8.7 square feet
Rudder area	4.8 square feet
Fin area	4.1 square feet
Stabilizer area	12.5 square feet
Landing gear tread	75 inches
Weight with engine fully equipped	985 pounds
Useful load	515 pounds

Performance

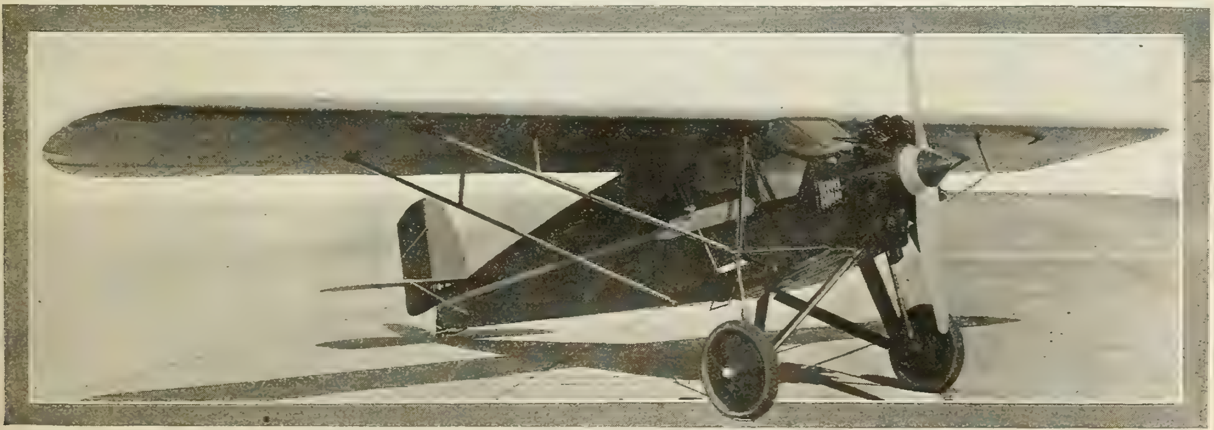
High speed	118 miles per hour
Cruising speed	102 miles per hour
Landing speed	40 miles per hour
Take-off (dead calm)	4.75 seconds
Climb (loaded)	950 feet per minute
Service ceiling	13,500 feet
Fuel consumption	7.5 gallons per hour
Oil consumption	1.6 pints per hour

AC MICA SPARK PLUGS

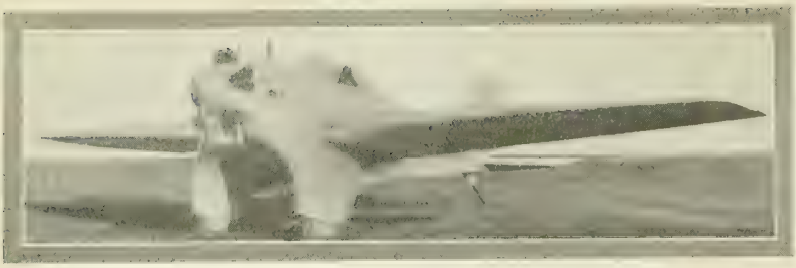
A COMPLETE line of mica insulated spark plugs designed for aircraft engines was announced recently by the AC Spark Plug Company. The new line of mica plugs is an addition to the present line of AC products. The plugs contain new features and are graded according to heat range.

The new mica spark plug is made gas-tight. A brass seal bushing located between a steel gland and the insulator is compressed and while electrically heated is molded into position. The side wire is electrically welded, permitting thirty-five times greater electrical conductivity and three times greater heat conductivity. Long insulation is provided between terminal and steel shell preventing spark "flashover" at high altitudes. The plugs are demountable, with metal parts cadmium-plated to prevent rusting.

The extent to which a plug is hot or cool is determined by the length of insulation exposed to the combustion gases, Hector Rabezzana, chief spark plug engineer of the AC company, explained in announcing the new line of products. The shorter the exposed insulation, the cooler the plug; the longer this insulation, the hotter the plug. The AC plugs have been graded according to heat range, making it possible to provide the correct plug not only for ordinary operating conditions, but for any extreme operating conditions encountered.



The LeBlond-engined Cardinal "Senior," a two-place high-wing cabin monoplane



CAIRNS METAL MONOPLANE IS FLIGHT TESTED

EDMUND B. CAIRNS of Naugatuck, Conn., has recently completed and had test-flown a new light all-metal monoplane of unusual design. The plane is a center-wing type, of sheet metal construction, with a semi-monocoque fuselage. The wings are full cantilever, built up of multiple spars of duralumin. Frame and wing are covered with Alclad. The ailerons are carried on bearings at the ends. There are no hinges. The ailerons, which are actuated with torque tubes from the cockpit, can be removed by taking out three bolts and all bearings can be inspected. The controls for the rudder and elevators are duralumin push rods. The tail skid and rudder are on ball thrust bearings.

Great care was taken to provide efficient streamlining. One of the unusual features is the concave underside of the fuselage which is said to make the ship unusually stable in banking and also has characteristics tending to reduce the landing speed. Powered with a LeBlond 60 engine with a 72-inch diameter propeller, 4-degree pitch, the ship has an estimated top speed of 140 miles and a landing speed below 40 miles per hour.

This job can be used for training by putting in dual controls. The plane is equipped with tanks having a fifteen-gallon fuel and two-gallon oil capacity, with reserve. The panel is fitted with six instruments. The cockpit is upholstered in red Morocco leather and finished in clear Duco.

The ship was built by Edmund B. Cairns for Clark Robinson, who designed the fuselage to fit one of Mr. Cairn's wing designs. The Cairns No. 79 wing is used. The span is 29 feet; the length overall, 18 feet; and the height, 5 feet 3 inches.

McCLATCHIE "PANTHER" AERO ENGINE

FOLLOWING tests and inspections in Washington, the MacClatchie L-head radial aircraft engine has received a Department of Commerce approval, according to an announcement by the MacClatchie Manufacturing Co., Compton, Calif.

This engine, which is known as the "Panther," is a seven-cylinder, four-cycle, air-cooled unit developed over a period of two years.

The elimination of rocker arms is one of the outstanding features of the new engine. The valves, which are of the tulip type, are actuated by direct contact rather than by rocker arms. There are two valves per cylinder. The Panther which develops 150 horsepower at 1,900 revolutions per minute, has an overall diameter of only 36 inches. The pressure lubrication system is simplified, as is the construction. The crankcase is in four sections.

Difficulties in providing sufficient cooling that have frequently been experienced in the development of radial engines of L-head design have been remedied in this engine by placing the exhaust ports in front, to receive maximum cooling, through forced circulation of air entirely around the valve seats and ports.

Because of the L-head feature, the grinding of valves can be accomplished without removing the cylinders—by unscrewing the port plugs over the valves. The decrease in the number of parts also makes for faster servicing and fewer repair jobs.

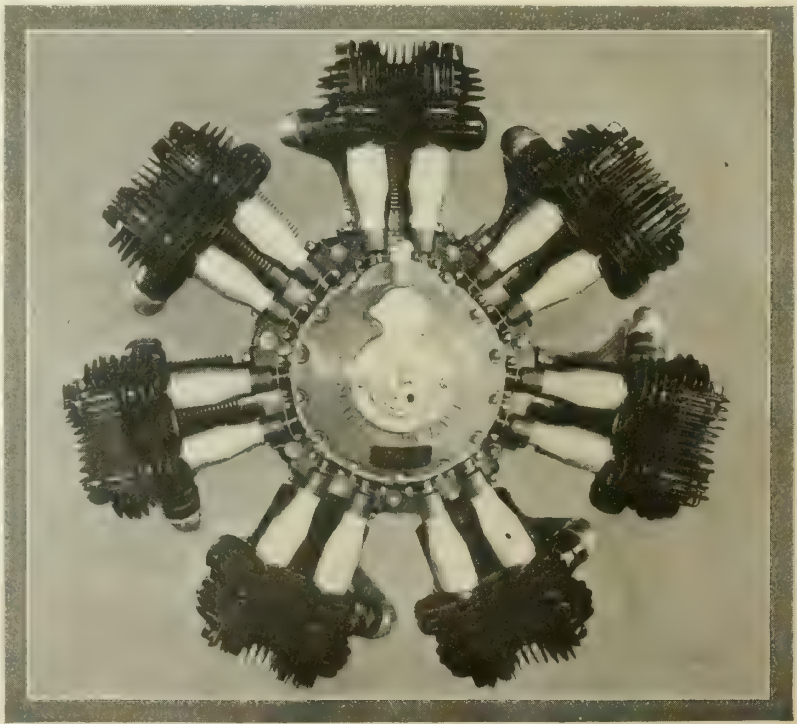
A program of straight line production of the new engine is planned for the new plant in Compton, the first section of which is already completed and stocked with machinery. The new factory is adjacent to the buildings in which the company manufactures oil field specialties.

Specifications

Bore	4.5 inches
Stroke	5.5 inches
Piston displacement	612.15 cubic inches
Compression ratio	5 to 1
Fuel consumption	.56 lb. per h.p. per h.
Oil consumption	.023 lb. per h.p. per h.
Ignition (dual)	Scintilla magnetos
Carburetor	Stromberg NAR-5A
Length overall	35 inches
Weight (dry)	400 pounds

UNIVERSAL CABLE SPLICING DEVICE

A CABLE splicing apparatus which was originally developed by Army Air Corps at Wright Field, has recently been placed in commercial production by the National Steel Products Company, Dayton, Ohio, a subsidiary of Aero Supply Manufacturing Company, Inc. The Universal Cable Splicing Device, as it is called, is said to eliminate the tediousness of getting a neat, tight splice by the usual method of providing make-shift wooden blocks to hold the cable and thimble in place when in the vise. That procedure necessitates for each size of thimble a set of blocks of different size. With the new device, however, proper adjustments can be made for any size of thimble. The universal action of the jaws tightens the cable around the thimble. When placed in a vise, this tool can be rotated so that the operator can exert an even pull on each strand.



Minimum frontal area is a feature of the 150 h.p. McClatchie "Panther" engine

THE B. M. W. 65 H.P. ENGINE

By Edwin P. A. Heinze

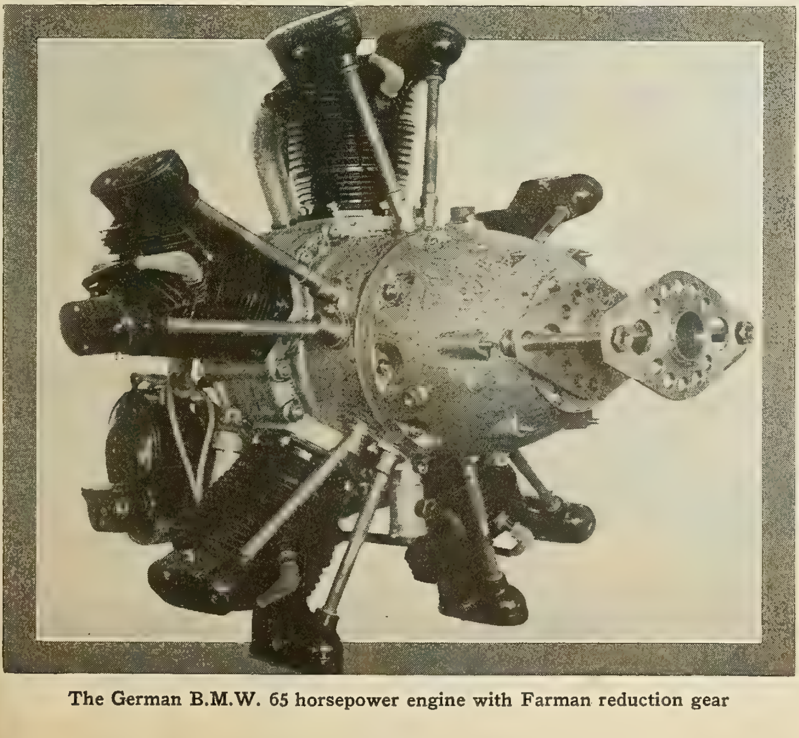
IN the International Light Plane Challenge that took place in August of last year the Bayerische Motorenwerke of Germany introduced a new light-weight engine built into a Klemm monoplane. The plane, piloted by Poss, finished third in the category of small planes, making a good start considering that the power plant was on its first public test.

The new B.M.W. engine is of the air-cooled radial type with five cylinders and develops 60 to 65 horsepower. This is a size of motor that has long been wanting in Germany, where constructors were forced to use French, British and Italian motors, and its arrival is especially appreciated inasmuch as the B.M.W. productions have a good name and are comparatively cheap. Bore and stroke are almost the same, the former being 3.26 inches, the latter 3.15 inches. The cylinders are of steel with an aluminum head screwed and shrunk on. The valve seats are set into the head and consist of aluminum-bronze alloy. The rocker casing is cast integral with the cylinder heads. The cam-drum is situated in the nose part of the motor, and the tappets, rods and rockers are entirely closed in.

The auxiliary drive gears (magneto drive, lubricating pump and hand starting device) are located at the back of the engine. Two magnetos are employed, being driven off a horizontal transverse shaft, and the oil pump is located on the end of a vertical shaft in the lower part of the casing. The hand starting device can be reached from the pilot's seat. A B.M.W. carburetor of the vertical type is used and the gas is distributed by a centrifugal blower, which is driven by spur gears off the rear end of the crankshaft, a slip clutch being attached.

A reduction gear of the Farman type is employed, which reduces the normal engine speed of 2,900 revolutions per minute in the relation of 2 to 1. With this speed, which the engine can keep up constantly, the motor has an output of 60 horsepower. The peak output is 65 horsepower with the motor revving up 3,000 per minute. The compression ratio is 6.3 to 1 and the weight of the whole motor 177 pounds. The fuel consumption is given at 235 grams per horsepower hour, which is equivalent to 0.52 pounds.

The B.M.W. works are simultaneously introducing a 9-cylinder radial engine of similar design in which a large number of parts will be interchangeable with the small motor, making for cheap production. The 9-cylinder engine is said to develop 120 horsepower at 3,000 revolutions per minute, with the constant output given as 100 horsepower at 2,830 revolutions per minute. This motor weighs 233 pounds.



The German B.M.W. 65 horsepower engine with Farman reduction gear

SOME NOTES ON THE newly developed Junkers DIESEL ENGINE

RECENT tests have been made of the Diesel airplane engine developed by the Junkers-Flugzeugwerke A.-G., of Dessau, Germany. The six-cylinder oil-burning engine has been given exhaustive tests on the stand and has had about sixty hours in the air, which included a trip from Dessau to Cologne and return.

The Diesel aeronautical engine has six opposed cylinders in line, the separate sets of pistons driving two crankshafts which are geared to the propeller shaft. By the use of opposed pistons, forty per cent of the heat-absorbing surface of each cylinder is eliminated. A fuel pump supplies oil into the cylinders under a pressure of 10,500 pounds per square inch and the fuel is ignited by the 14:1 compression ratio of the cylinders. Fresh air is forced into the chambers by a single-action centrifugal blower driven by the lower crankshaft through a pinion wheel.

By the single control, the throttle, the revolutions per minute can be regulated from 1,600 to 350. The fuel consumption of the new engine is .39 pounds per horsepower per hour of gas oil having 4,500 calories per pound. The consumption of lubricating oil is .022 pound per horsepower per hour.

Specifications

Maximum crankshaft revolutions per minute	1,600
Weight per h.p. (normal power output)	3.08 lbs.
Weight per h.p. (maximum power output)	2.86 lbs.
Stroke of each piston	210 millimeters
Normal rating	600 horsepower
Maximum output	850 horsepower
Cylinders	6
Gearing ratio	1.44:1
Maximum propeller r.p.m.	1,120
Dry weight (no hub or propeller)	1,815 lbs.
Weight of hub	37.4 lbs
Compression ratio	1:14
Bore	120 millimeters
Length overall	1,700 millimeters
Height overall	1,600 millimeters
Width overall	500 millimeters
Fuel consumption	180 grams per h.p.
Consumption lubricating oil	10 grams per h.p.

SMALL FLAME APPARATUS

PLANTS maintaining testing laboratories of various sorts do a great deal of their experimental and research work with the aid of small flame apparatus. The flame can be easily controlled and is hot enough to melt various metals. A most convenient and complete laboratory installation consists of a small tank of dissolved acetylene, a hot plate, a Bunsen burner, an acetylene-and-air torch with air control, a reducing valve, a three-way branch valve, and the necessary red gum tubing.

A special type of torch has been developed for test work and uses compressed air in addition to dissolved acetylene. The flame may be changed from the brush type to an intense needle point by adjusting the air supply. This is accomplished by a simple twist of the adjusting screw. The brush, or bunsen flame, has a temperature of approximately 2,800 degrees Fahrenheit and the needle point flame produces approximately 3,300 degrees Fahrenheit, making it suitable for any work requiring high temperature. A wide latitude of temperature control is possible by adjustment of the gas pressure.

THE AIR SERVICES

DAVISON REPORTS AIR CORPS NEEDS

THE most pressing problem which confronts the Army Air Corps is that of developing a satisfactory system of promotion, Assistant Secretary of War F. Trubee Davison declared in his annual report recently made public. Unless the problem is solved, the efficiency and morale of the Air Corps will be damaged and many valuable officers will be lost to the service, according to the Assistant Secretary. The problem of obtaining a sufficient number of grades and rating for enlisted men is also a serious one, he said.

Mr. Davison characterized the five-year building program as out of balance principally in that there is a serious shortage of airplanes to carry out the necessary training and to equip properly the tactical units. He declared the fulfilment of the Five-Year Program to be the first objective of the Air Corps, and stated that the program can be carried to completion in a smooth and efficient manner if sufficient funds are provided and if legal obstacles, which complicate the personnel situation, are removed.

The present sluggish promotion schedules impose injustices and handicaps upon the flying personnel, and officers are performing duties out of all proportion to their ranks, Mr. Davison said. This situation may be remedied only by legislation. The Furlow Bill, as it passed the House the last two sessions of Congress, or the Air Corps provisions of Senate bill No. 4, were declared the most satisfactory solutions.

Mr. Davison stated that, as the enlisted strength of the Air Corps is increased in accordance with the Five-Year Program, the proportion of grades and ratings allotted to the Air Corps is decreased. As enlisted increments are added to the Air Corps the only grades and ratings provided with these increments are those which belonged to the units of non-technical branches of the Army, disbanded to give the Air Corps its quota of enlisted men. These units, being non-mechanical, do not contain the proportional number of grades and ratings which should be assigned to such a highly technical branch as the Air Corps. The Assistant Secretary recommended the awarding of grades and ratings to enlisted men in the Air Corps commensurate with their skill and duties as the only way in which these men can be kept in the service after they have been trained. He said the percentage of enlisted pilots cannot be increased until legislation is enacted providing a suitable grade for the enlisted pilot.

Referring to the Five-Year Program, Mr. Davison said that it required at the conclusion of the second increment 1,237 regular officers, and that on July 30, 1929, there were actually commissioned in the Air Corps 1,143 officers. Unless vacancies are available for each graduating class, especially qualified and eligible graduates of the Advanced Flying School will be lost to the Army and the Five-Year Program will not be met in this particular.

The Air Corps Act provides that 550 Reserve officers be extended active duty with the Air Corps beginning with the fifth increment. Pointing out that under present law only ten per cent of the Reserve officers can be kept on active duty for an additional year, Mr. Davison recommended that the Secretary of War be authorized to keep as many Reserve officers on extended active duty the second year as his discretion and funds will permit. He also recommended that any increase in training facilities be held a minimum as an increase of the training facilities of the Air Corps requires additional airplanes and personnel to be diverted from tactical units.

In 1929, a board of officers studied the Five-Year Program and, among other things, reported that of the 1,800 airplanes authorized by the Air Corps Act, 794 will be available for assignment to tactical units. Operations of the Air Corps during the past year were curtailed by lack of airplanes, hangars and other equipment, Mr. Davison said. He urged that tactical units be equipped with airplanes called for by their tables of organization. Mr. Davison deplored the lack of permanent construction, and pointed out that a very large amount of new construction will be required to provide for the new units created by the Five-Year Program. Limitations of the budget have caused a number of building projects to be deferred, with the result that the Army Air Corps is behind on new construction.

The Assistant Secretary of War also recommended that the future of the lighter-than-air branch of the Air Corps be determined and that due consideration be given the development of the airship in the work of the Army Air Corps.

Air Corps Planes Attend Mexican Aviation Show

FOUR planes were exhibited by the United States Army Air Corps in the aircraft show held in conjunction with Mexican Aviation Week from December 10 to 15 at Mexico City, Mexico. The planes exhibited by the Air Corps were: a Curtiss Condor type B-2 bomber, from Langley Field, Va.; a type A-3 attack plane from Fort Crockett, Galveston, Texas; one pursuit plane and one observation plane from Kelly Field, San Antonio, Texas. The planes were fully equipped.

The United States was invited to send aeronautical exhibits to the aircraft show held during Mexican Aviation Week by the Mexican officials through the American ambassador at Mexico City.

MOFFETT REPORTS ON NAVAL AIR SERVICE

RECOMMENDATION that the construction of the aircraft carrier for the Navy which has been authorized by Congress should be pushed to completion as soon as possible was made by Rear Admiral W. A. Moffett, Chief of the Bureau of Aeronautics, Navy Department, in his annual report recently made public. The report announced the discovery of a new source of natural gas with a much higher helium content than any other gas hitherto known, and reviewed the trends of development in Naval aviation.

Rear Admiral Moffett stated that the additional aircraft carriers necessary to give the authorized carrier parity tonnage allowed under the Washington Limitation of Armament Conference should be secured as soon as possible. Developments have demonstrated conclusively, especially during the past year, the immense military value of aircraft carriers, and it is the most important requirement, not only of Naval aviation, but of the Navy as a whole, to push to completion the construction of the carrier already authorized, Rear Admiral Moffett said.

Referring to the new source for helium, he stated that a request had been received from the Helium Company, which supplies this gas to the Navy, to authorize some delay in the uncompleted portion of their contract to supply the Navy with helium. The request was made in order that the company could hold up its production schedule and move its plant to the location of the new supply of helium. With the company at the new location, the helium will be obtained at a lower cost.

One of the most gratifying features of Naval aviation development, according to Rear Admiral Moffett, is the increased number of hours flown by pilots and the increase in the safety of operation. During 1929, the average pilot in the Naval Air Service flew 216 hours, as compared with 182 for the previous year and with 72 for the year 1922. At the same time, the flying hours per fatal accident have increased from 7,226 for the year 1927-28 to 11,288 for 1929.

The single row fixed radial engine continues to predominate in the power plant field utilized by the Navy. Air-cooled engines of the in-line and V types are being produced in some quantity, and the Navy has conducted type tests on the American Cirrus, a four-cylinder, air-cooled engine of 90 horsepower, and the Scorpion, a four-cylinder engine of 110 horsepower. The Navy plans to produce several Wright V-1560 engines for experimental purposes. This engine is a modification of the Wright V-1460 and is expected to develop 600

(*Continued on next page*)

AIRCRAFT ENGINES
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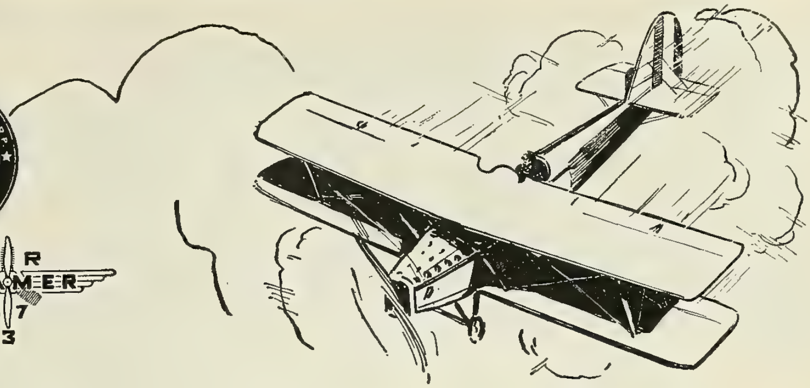

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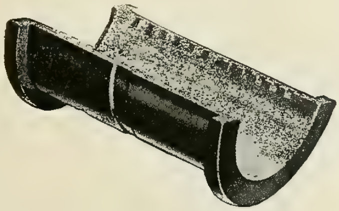

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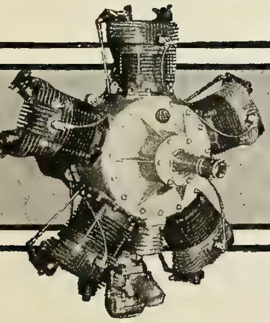
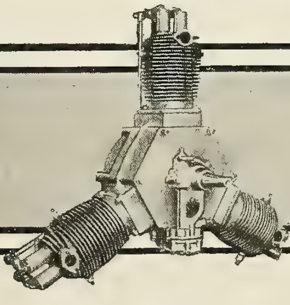
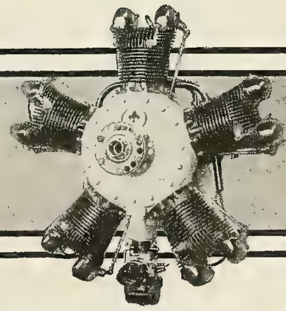


The Velie 5 cylinder Radial 70 horsepower aircraft engine



The Szekely Radial Sky Roamer 3 cylinder 40 horsepower aircraft engine



The LeBlond 5 cylinder 60 horsepower aircraft engine. Other LeBlond aircraft engines are the 3 cylinder 40 horsepower, and 7 cylinder 90 horsepower engines.

Langley Field football team, Southern District Army champions for the Third Corps Area.

(Continued from preceding page)

horsepower. Experiments on the Westinghouse Diesel are progressing satisfactorily, and results obtained indicate that it will be developed into an adequate power plant for lighter-than-air craft.

During the past year duralumin propellers not only have become standard equipment for Naval aircraft, but have practically replaced the wooden propellers that were formerly in service. A method of stress analysis has been developed by the Navy which has almost eliminated propeller failures. The detachable-blade type of metal propeller has shown a wide range of uses due to the adjustable-pitch features, with the result that some blade designs are used on several different types of planes. The demand for metal propellers has reduced the cost to the point where metal propellers now cost less than wooden propellers for the same number of flying hours.

Revision of Naval Flight Syllabus Suggested

A REVISION of the Naval Aviation flight syllabus and a radical reduction of the ground school course has been recommended by a committee which was recently appointed to study means of obtaining Naval officers suitable for flight training, and methods of training Naval flight officers. The recommendations of the committee have been submitted to the Secretary of the Navy for further action.

The committee was appointed at a recent Naval conference which met for the purpose of discussing methods of filling vacancies in the Naval Air Service and of obtaining sufficient Naval flight officers in proportion to the gradually increasing number of airplanes being put into Naval Air Service in accordance with the five year building program. The committee was assigned to the study or the problems to make specific recommendations for meeting present and future requirements of Naval flight personnel.

LIEUT. PHILLIPS MELVILLE of the Army Air Corps has been appointed assistant military attaché for air to Ambassador Harry F. Guggenheim of Cuba. Lieut. Melville flew to Havana in a Vought Corsair to take up his duties. He will use the plane for inspection flights over Cuba.

THE Southern District Army championship for the Third Corps Area was won recently by the Langley Field, Va., football team. The Langley Field team suffered only one defeat during the season when it was beaten by the Army team representing the barracks at Carlisle, Pa. Capt. George Usher coached the Langley Field team.

LT. FISHER AWARDED SCHIFF TROPHY

THE Herbert Schiff Memorial Trophy, emblematic of the highest safety performance attained by a unit of the Naval Aviation Service during the fiscal year, was presented by President Hoover on December 14 to Lieut. Thomas Gerry Fisher, commanding Training Squadron Seven of the Eleventh Naval District based at the Naval Air Station, San Diego, Calif. Lieut. Fisher and his command of about fifty officers and enlisted men, were in the air approximately 9,000 hours during 1929 without an accident and attained the lowest record of accidents to planes and personnel in proportion to the number of hours flown.

Lieut. Fisher and his squadron were the first recipients of the Herbert Schiff Memorial Trophy under the new rules of the trophy committee, headed by Rear Admiral Moffett, which voted to award the cup to the Naval squadron or other flying units making the best safety record for flying during the fiscal year. The committee formerly awarded the cup to the individual flier establishing the best safety record. Hitherto, the trophy has been awarded four times to the Naval aviator attaining the greatest number of hours of flying without accident.

To be eligible for the Schiff trophy, a Naval unit must have flown a minimum of 1,000 hours during the year. Each squadron or unit is assigned a handicap according to the nature of its duty, the fighting squadrons where the hazards of operation are greater having the lowest handicap. Each accident suffered by a squadron is assigned a standard multiple according to the nature and extent of the damage. The safety score of the unit is obtained by adding the basic handicap to the quotient of the sum of all the accidents with their standard multiple divided by the total number of hours flown.

THE Army Air Corps has completed an aerial photographic survey of the west coast of the southern peninsula of Michigan. The territory photographed covered 2,200 square miles and included the counties of Muskegon, Oceana, Mason and part of Lake County. The photographic tour was made by the Army Air Corps at the request of the U. S. Geological Survey. A total of 3,300 photographs were taken and will be used by the bureau to make maps of the area covered.

THE installation of a radio beacon at Kelly Field has just been completed. It has a range of 200 to 300 miles, varying with weather conditions. The beacon is operating under the supervision of Capt. Perry Wainer, Army Air Corps.

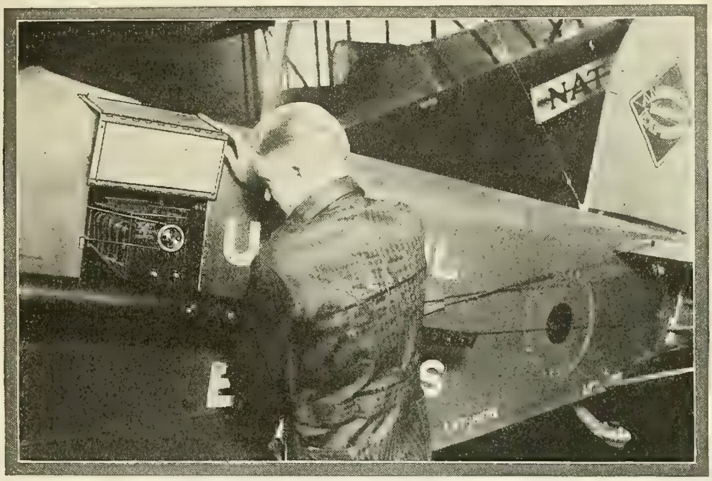
OFFICIALS of the Federal Government recently announced that two radio beacons will be installed at Fort Crook, ten miles south of Omaha, Nebr., at a cost of $20,000. One of these will be a range beacon while the other is to be a marker. The range beacon will be erected on the hill just southeast of the present radio station. Four aerial masts will be used, one being ninety feet high and the others 35 feet. The completion of these improvements will enable Fort Crook field to keep in touch with all planes on the transcontinental route. Beacons will also be installed by the Government at York, North Platt and Sidney, Nebr., and Cheyenne, Wyo.

Army Air Corps officers of the Seventh Area, located at Fort Crook, will soon be flying all-metal planes, Major H. J. Houghland, in charge of Army aeronautics at the Air Corps base announced. The Fort Crook field is now on a par with other western Army ports in the matter of flying equipment.

IN response to a suggestion by Congressman W. Frank James of the House Military Affairs Committee, the city of Alameda, Calif., has increased the acreage offered to the War Department for an Army air base from 311 to 1,108 acres. The additional acreage takes in territory which Congressman James said was needed for future expansion if a base should be located at that site.

THE photographic division of the Pensacola Naval Air Station has completed a five-reel motion picture which shows in detail the methods of picture-making employed in naval photographic work. The picture will be exhibited to students in classes studying naval photography.

AN area of 12,000 square feet in Hangar No. 3 at Oakland Municipal Airport has been leased by the Oakland, Calif., Board of Port Commissioners to the United States Naval Air Reserve squadron. The monthly rental is $300. The lease extends until next August, at which time it is planned to construct a large hangar for the squadron. The proposed construction has been approved by the Navy Department.



F. E. Gray, N. A. T. radio technician, inspecting Stromberg-Carlson radio receivers in a Douglas Air Mail and Express Plane.

Through Hundreds of Hazardous Hours, N. A. T. Finds *Safety* in Stromberg-Carlson Radio

PIERCING the wind and the fog of the Alleghenies . . . . Plying determinedly to the course that means *surest* and *quickest* delivery of the mails . . . . That's the job of the National Air Transport pilot on the regular hop between Chicago and New York. And a job that he now tackles with peace of mind.

All because ships used in N. A. T. mail service go equipped with Stromberg-Carlson Aircraft Radio Receivers. For more than four years, through every conceivable condition of weather, over some of the worst flying country known, these famous planes have kept their way with incredible accuracy. The electric beam of the radio beacon—unaffected by wind or storm—has been their ever dependable source of guidance.

Stromberg-Carlsons were the first aircraft beacon receivers to be used on a regularly established mail route in the United States. Developed when beacons were in their infancy and refined through long service, they have become standard for performance and structural design. They are built to withstand abuse from heat, cold, humidity, dryness, dust, fogs and frost or any other impediment to safe flying.

Far-seeing manufacturers of aircraft, transport companies and others interested in flying, will do well to investigate the advantages of Stromberg-Carlson Aircraft Radio Receivers.

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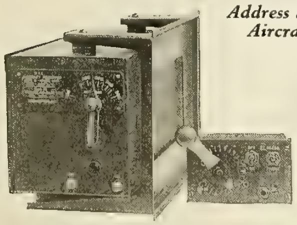

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SPARK PLUG TESTS FOR ARMY AIR CORPS

EXPERIMENTAL tests of spark plugs for aircraft engines will be conducted for the Army Air Corps by the Materiel Division, Wright Field, Dayton, Ohio, according to a recent announcement. Manufacturers of spark plugs have been invited to submit aircraft engine spark plugs to the Materiel Division for subjection to experimental tests and inspection in accordance with existing performance specifications.

According to the policy which has been adopted, any manufacturer may submit spark plugs for the tests. If the product fails to meet the requirements, it will be returned to the manufacturer with comments and criticisms of the design and recommendations for improvement. Manufacturers submitting their products to the tests will not be reimbursed for the spark plugs or for any damage done to them during the tests.

The Department of War has authorized the purchase of quantities not to exceed 2,000 from each manufacturer whose product meets with the requirements of the tests. These plugs will then be given service tests, which consist of installation in aircraft engines and tests under actual flying conditions for a period not to exceed fifty flying hours.

The names of manufacturers whose spark plugs meet the performance specifications and pass the service tests will be placed on an approved list for production procurement, provided they furnish satisfactory proof of their ability to produce these plugs in further quantity. Manufacturers whose names are placed on this list will automatically receive copies of circular proposals advertising for quotations on aircraft engine spark plugs.

CAMP KEARNEY SITE CHOSEN FOR NAVY DIRIGIBLE BASE

CHARLES F. ADAMS, Secretary of the Navy, recommended in a recent report to Congress the selection of Camp Kearney, at San Diego, Calif., as the site for the West Coast Dirigible Base for the United States Navy. Mr. Adams stated in his report that the Camp Kearney base is strategically located, and will permit closer contact and coöperation with the fleet than any other available site. The base will be used to house one of the two rigid airships which the Goodyear-Zeppelin Corporation will construct for the Navy Department at Akron, Ohio.

The company has started the construction of the *ZRS-4*, the first of the two airships, and erection of the *ZRS-5* is scheduled to be completed by the end of 1932. The airships will be used for operation with the fleet, one based on the West Coast and the other on the East Coast, Camp Kearney being the base for the airship assigned to the West Coast.

Mr. Adams recommended in his annual report to President Hoover the expansion of the Naval Air Service to a proportionate relationship with the fleet as a whole by the construction of additional aircraft-carriers. Mr. Adams declared that there is an urgent need for additional aircraft tonnage, and recommended that immediate steps be taken to provide for parity of aircraft-carrier tonnage provided for in the Washington Limitation of Armaments Conference.

Hall Aluminum Flying Boat Tested for Navy

INITIAL test flights of the XPH-1, built for the United States Navy by the Hall Aluminum Aircraft Corporation of Buffalo, N. Y., have been made at the Anacostia Naval Air Station. The first flight tests were made by pilots of the Hall company. Rear Admiral William A. Moffett, Chief of the Bureau of Naval Aeronautics, and other officials observed the flights. Further test flights will be made by the Navy.

The XPH-1 is an all-metal flying boat powered with two Wright Cyclone engines of 525 horsepower each. Three-bladed propellers are used. The plane is equipped with two gasoline tanks with a combined capacity of 870 gallons, and has a cruising radius of 1,300 miles. There are two gun-cockpits, one located in the fore part of the fuselage and the other behind, with emplacements for machine guns in both cockpits. Fully equipped, the XPH-1 weighs 6,400 pounds and carries a five-man crew including pilot, mechanic and gunners. Adapted for commercial purposes, the ship would accommodate 22 passengers.

Porosity Testing Device for Air Corps

AN apparatus for calculating the amount of air passing per minute through a fabric has been developed and constructed by the Material Engineers of the Bureau of Aeronautics, Navy Division, assisted by the Bureau of Standards. The apparatus is for use in determining the porosity of material used in parachute construction. In addition to area, the rate of descent of a parachute depends principally upon the porosity of the fabric from which it is constructed.

NEW ALGIERS NAVAL AIR BASE

By BEATRICE COSGROVE, *Leigh News Service*

TWENTY minutes from the center of New Orleans by ferry across the Mississippi River from the foot of Canal street, the city's main artery, lies the new Algiers Naval Airport, the seventh air base to be established by the United States Navy for its fliers. It is an 83-acre field, fully developed, with facilities for both landplanes and seaplanes, and with these facilities of the field available in emergencies to all planes. The site was selected for the construction of the Navy air terminal on the recommendation of Commodore Ernest Lee Jahncke, Assistant Secretary of the Navy.

The decision of the United States Navy to establish an airport at this location is significant. It is the beginning of a naval airport of strategic importance, of consequence doubly as a military defense for the entire Gulf Coast and the lower Mississippi Valley, and as an impetus to commercial flying on southern cross-country routes and on the Latin-American air communication lines which promise rapid growth. "New Orleans is excellently located for commercial and military aviation, permitting operations in both land and seaplanes," Commodore Jahncke explained in recommending the site. "Its central position on the continent, its accessibility to the sea, and its commerce, make it a potential air terminal, one worthy of our interest, consideration, and development."

For several years the United States Navy has maintained a station at Algiers. It is this station which will furnish the location for the airport. More than one-third of the 214 acres belonging to the station will be utilized as a completely equipped modern landing field. The construction of this field will mean the razing of several buildings, in particular the temporary structures built during the war which have been occupied by the United States Veterans' Hospital. The veterans will be transferred to Alexandria, La., and almost immediately the whole of the designated area will be given over to the new flying field, which is expected to be ready for use before the end of the present fiscal year.

The new Algiers air base is shaped like a T. The L part of the T, running on the southern and eastern boundaries of the station, is the land field, which will have a four-directional runway, permitting planes to land with safety and ease regardless of the direction of the wind. The north-south runway is 2,500 feet long and 875 feet wide; the east-west runway is 3,400 feet long, and 425 feet wide at its narrowest point.

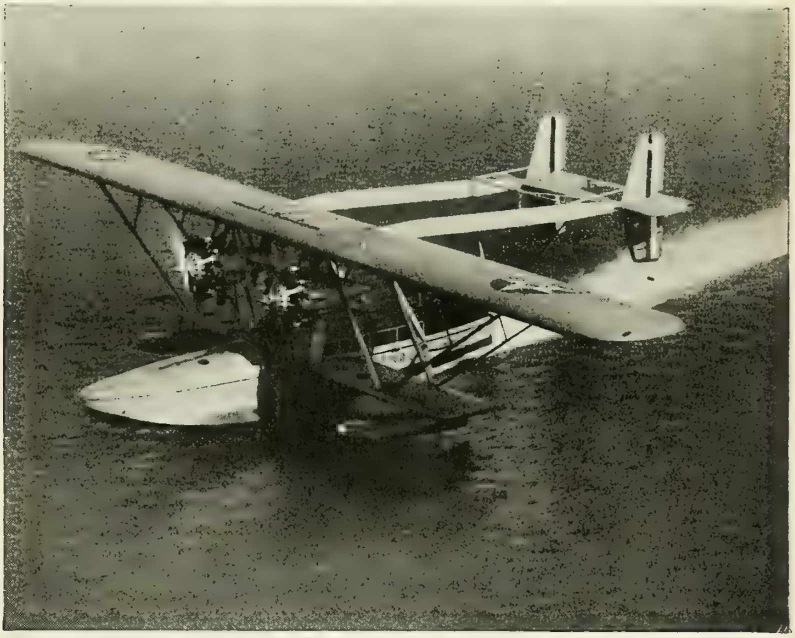
The remaining part of the T will be developed for the use of the seaplanes. A river front of about 600 feet will be available for seaplane ramps. The construction of seaplane facilities will include a timber runway for hauling and launching equipment, as well as storage for supply space. In these facilities lie the greatest potentialities of the new airport. The disadvantages of the Pensacola, Florida, air base are eliminated in the Algiers site. Pensacola's limited harbor does not permit full development of seaplane possibilities; the *Lexington* and the *Saratoga*, the two largest aircraft carriers, which cannot navigate in Pensacola Bay, can, without difficulty, come up the Mississippi to the New Orleans harbor.

The entire program of development will be in accordance with Commodore Jahncke's detailed plans. These are the result of a visit of inspection last summer when the new port was discussed with Commander R. E. Cassidy, commandant in charge of the naval station.

Plans for the immediate use of the airport provide that it will be utilized as a training terminus for Naval fliers from the training base at Pensacola. Of civilian interest is the possible use of the port as a base for relief flights in flood emergencies.

FLYING OVER WATER

The keenest of aviation's pleasures for men who love the sea



Yachtsmen discover in the Sikorsky Amphibion a satisfying combination of keen performance and luxurious comfort. The "S-38" is eminently seagoing, yet she is equally at home in landing or taking off ashore

FOR the born yachtsman the transition from water to air is a natural one. Men who long have believed that boats afford the finest of sports have found a whole new order of enjoyment opened up for them on their first flights. Particularly flights over water.

Natural, too, is the yachtsman's instant liking for the "S-38," the Sikorsky Amphibion that flies with eight or ten passengers at 125 miles an hour. With a perfect landing "field" below you, reaching as far as the eye can see, you may fly low enough to get the full thrill of your speed. And yet the shore is always available. A touch of the convenient control drops the landing gear and you are ready to taxi up the beach.

The "S-38" has a ceiling of 18,000 feet and will fly and maneuver on either engine. It has a cruising range of over 600 miles at a speed of 110 miles per hour. In brilliance of performance, in luxury and in all around air-worthiness the Sikorsky is a yachtsman's craft.

Descriptive literature will be sent on request. Sikorsky Aviation Corporation, Bridgeport, Connecticut. Division of United Aircraft & Transport Corporation.

SIKORSKY AMPHIBION

WESTERN NEWS

HAWAII BEGINS AIR SERVICE

THE first air transport service operating on a regular schedule and carrying passengers, baggage and freight between the six islands in the Hawaiian group, has been established by the Inter-Island Airways, Ltd., with headquarters at John Rodgers Airport on the island of Oahu, near Honolulu, T. H. The company, which inaugurated the service on November 11, operates two twin-engined Sikorsky amphibions, each accommodating ten passengers, on the inter-island route, and a Bellanca "Pacemaker" accommodating six passengers on sight-seeing trips over the island of Oahu.

Inter-Island Airways, Ltd., is a subsidiary of the Inter-Island Steam Navigation Company, which operates a fleet of surface ships in the Pacific. The airway company is capitalized at $500,000 and has the privilege of increasing its capital to $5,000,000. The steamship company controls approximately sixty per cent of the stock of the airway company, which has a working capital estimated at $250,000. The airline project is sponsored by business men of Hawaii.

The company expects to attract passengers to some extent from the tourist trade, but will depend upon the resident population for a majority of its patronage. A program of educating the Islanders to the advantages of air travel will be undertaken, stressing particularly the time saved in using planes to travel between the islands. It is estimated that the planes will make the journey from Honolulu to Hawaii, the island most distant from Oahu, in about two hours in comparison with the twelve hours required to make the same trip by boat. The aerial sightseeing service will be conducted on a daily schedule, trips being made over Honolulu and around the island of Oahu, as a source of revenue as well as a means of familiarizing the population to the sight of airplanes as familiar objects and developing air-mindedness among the Islanders. The Inter-Island Airways company will coöperate with the Matson Navigation Company in the sale of tickets for passages on the Hawaiian planes. The Matson company, closely associated with the Inter-Island Steam Navigating Company, will place tickets on sale at San Francisco and other points, making them easily accessible to tourists.

The inaugural ceremonies marking the opening of the line on November 11 at the John Rodgers Airport included addresses by Governor Lawrence M. Judd and Riley R. Allen, president of the Chamber of Commerce of Honolulu. The two Sikorsky planes made the first journey over the route accompanied by a fleet of planes, including ships flown by pilots of the Army Air Corps and the Naval Aviation Service. During the first week of operation a total of 3,000 miles was flown on the regular route and on sight-seeing trips by planes of the company.

A cross-wind runway has been completed at the John Rodgers Airport in addition to an asphalt-macadam take-off strip, and a hangar, which will house the air equipment of the company, has been constructed at a cost of $25,000.

The schedule of operation which has been established by Inter-Island Airways calls for a round trip from Honolulu to Hilo by way of Manui and return. These trips are made every Monday, Wednesday and Friday, the plane leaving Honolulu at 8:00 a. m., and returning at 5:15 p. m. Stops are also made at Molokai and Lanai on request. Two round trips on Tuesday and Saturday each are made from Honolulu to Kauai.

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Landing fields on the various major islands used by Inter-Island Airways are as follows: John Rodgers Airport, Island of Oahu; Hilo Airport at Waiakea, Island of Hawaii; Maalea Airport near Kihei, Island of Maui; the field of the Hawaiian Pineapple Company, Island of Lanai; the Hoolehua Airport, Island of Molokai; and the Hanapepe field, Island of Kauai. An emergency landing field has been established at Hawii, on the northwest tip of the Island of Hawaii. In the event that a plane is forced to utilize this field, passengers will be transported to Hilo by automobile.

Stanley C. Kennedy has been appointed general manager of the Inter-Island Airways, Ltd. Mr. Kennedy is assistant general manager and director of the Inter-Island Steam Navigation Company, and was a pilot in the Naval Aviation Service during the World War.

Other officers of Inter-Island Airways, Ltd., are as follows: Frank C. Atherton, president; Gaylord P. Wilcox, vice president; Charles R. Hemenway, vice president; Arthur H. Armitage, secretary-treasurer; and A. G. Budge, John W. Waldron, and J. E. Russell, directors.

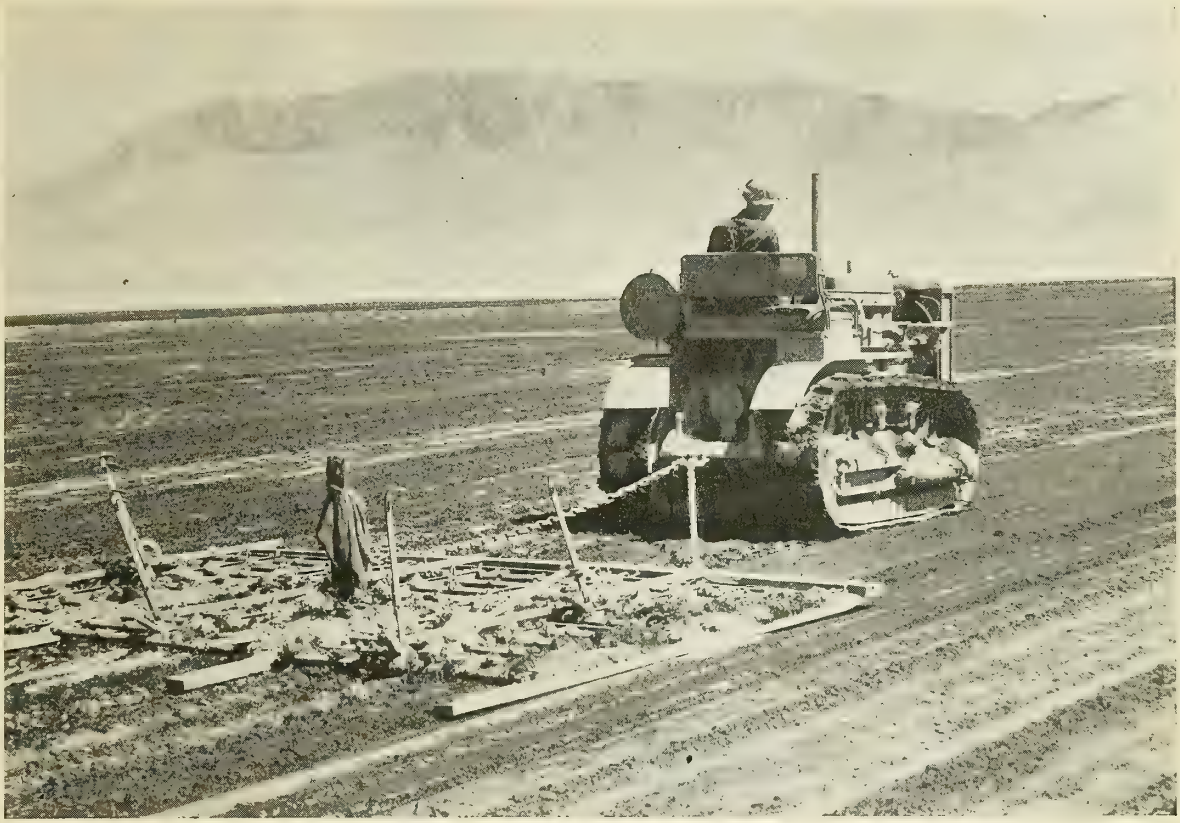
A second company, the Hawaiian Airways, plans to establish an air transport service, carrying passengers, freight and baggage and using the same route as the Inter-Island company. The Hawaiian Airways has started preliminary organization of the service, and a Kreutzer Air Coach powered with three Warner engines has been placed in operation on an irregular schedule. Several trial flights of an experimental nature have been made to islands in the Hawaiian group. According to the report, the Hawaiian Airways will operate two trimotor Fokkers and three Kreutzer ships, and is sponsored by Standard Airlines, the Los Angeles Steamship Company, and the Aero Corporation of California.

New Directors of Pacific Zeppelin Transport Company

T. W. LITCHFIELD, chairman of the Board of Directors of the Pacific Zeppelin Transport Co., Ltd., recently announced the election of the following addi-

(Continued on next page)

Sikorsky amphibions of the Inter-Island Airways, Ltd., at John Rogers Airport near Honolulu before starting the flight to Hilo which inaugurated the inter-island service of the company



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SMOOTHED and leveled by a "Caterpillar" Tractor—the surface mixed with road oil to conquer dust—Albuquerque, New Mexico, has a modern landing field. "Caterpillar" Tractors supply the power for most every job of airport construction—*and maintenance.* Purchased for the original clearing and smoothing, the extra power and extra traction find plenty of work in later days, from hauling around big planes to clearing snow from the lanes.

There's a book, free for the asking, telling about "Caterpillars" and Airports.

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TEN	$1,100	TWENTY	$1,900
FIFTEEN	$1,450	THIRTY	$2,375
SIXTY	$4,175		

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"Caterpillar" Tractors

CATERPILLAR

REG. U. S. PAT. OFF.

TRACTOR

Engineers of the companies subsidiary to the United Aircraft and Transport Company

(*Continued from preceding page*)

tional directors of the company, the new officers being representative of interests concerned with Pacific traffic; R. Stanley Dollar, Kenneth R. Kingsbury, Harry Chandler, W. P. Roth, Col. E. A. Deeds, Herbert Fleischhacker, F. B. Rentschler, Clarence H. Cooke, G. B. Grosvener, John R. Galt, Henry O'Melvany, and Walter Dillingham.

AIRPLANE PARACHUTE DEVICE TESTED

[Howard V. Waldorf]

TESTS of a new double parachute safety device for airplanes designed by Charles Broadwick, were made recently at Tracy, California. The tests were only partially successful. The device, which was produced after eight years of experimenting, included two parachutes, each weighing 64 pounds, measuring 64 feet across the base, and requiring 825 yards of silk for its construction. It was designed by Broadwick in an attempt to eliminate the spinning motion of a plane, which formerly took place in tests of a single airplane parachute.

The parachutes were folded under the fabric at the ends of the upper wing of the test plane, and were fastened to the front spar by a cable. Wires to the cockpit actuated snippers which cut away the fabric, releasing the parachutes. The natural spring of the silk was depended upon to place the parachutes in the position so that the wind pressure would open them. A second wire to the cockpit actuated an emergency release to free the parachutes from the spar connection in the event of tangling or faulty operation.

E. J. Mickey McKeon, of the Curtiss-Wright staff, was the test pilot at the Tracy test. A 2,800-pound Swallow biplane was used. At 5,000 feet, McKeon pulled the release and only one parachute opened, forcing the plane to spin slowly. When the second parachute opened the spinning motion forced the silk to wrap around the fuselage and jam into the aileron and tail surfaces.

Despite the lack of supporting surface, the plane, with the engine idling, lost altitude slowly. Unable to halt the spinning McKeon jumped at 1,500 feet altitude, and landed safely by parachute. The plane continued to spin down slowly and struck nose-first in the middle of a hayfield. Although less than half of the intended supporting surface was in operation, the total damage to the plane was a bent propeller. An examination showed that the first parachute to open was ripped by the spinning motion.

UNITED OFFICIALS MEET IN SEATTLE

THE United Aircraft and Transport Company's technical committee recently met at the plant of the Boeing Airplane Company, Seattle, Wash., to discuss technical details of design and construction of airplanes and operating problems. Among those who attended are those shown in the accompanying photograph. They are: Lower row (left to right); C. H. Chatfield, Pratt and Whitney Aircraft Company; Frank W. Caldwell, Hamilton Standard Propeller Corporation; Charles J. McCarthy, Chance Vought Corporation; Thomas F. Hamilton, chairman of the board of Hamilton Standard Propeller Corporation, and director of United Aircraft and Transport; Mac Short, Stearman Aircraft Company; A. K. Humphries, Pacific Air Transport; and C. L. Evtvedt, Boeing Airplane Company. Upper row (left to right): F. E. Weick, Hamilton Standard Propeller Corporation; C. N. Monteith, Boeing Airplane Company; I. I. Sikorsky, Sikorsky Aviation Corporation; D. B. Colyer, Boeing Air Transport; John K. Northrop, Northrop Aircraft Corporation; and George J. Mead, chairman of the technical advisory committee, vice president of the Pratt and Whitney Aircraft Company and director of the United Aircraft and Transport Company.

Airplane Appliances Company Formed to Produce Starter and Variable Pitch Propeller

THE Airplane Appliances Company has been organized by C. M. Fuller, president of the Richfield Oil Company of California, and a group of associates for the purpose of going into immediate production on a controllable pitch propeller and an electric starter for airplanes. The organization has been in informal existence for the past two years during the experimental period for both devices, according to a recent announcement of the firm's attorneys.

The electric starter, which includes an auxiliary hand crank to be placed either inside the cockpit or outside the cowling, is 32 pounds lighter than any airplane electrical starter now in commercial use and draws less amperage and voltage than the ordinary automobile starter, according to the announcement. It has but seven moving parts.

Tests of the propeller as reported by officers of the new company show that, as compared to an airplane equipped with the type of propeller now used, it will enable an airplane to climb 30 per cent faster; gives a 30 per cent higher cruising speed at lower engine revolutions per minute; decreases take-off time approximately 50 per cent; makes landings possible at a maximum angle of 35 per cent, giving a three to one gliding ratio as against a seven to one ratio with the ordinary propeller; in reverse it decreases the landing run approximately 80 per cent; lessens the possibility of nosing over when landing because of uneven or soft ground surface; and cuts down gasoline consumption 20 per cent.

A. K. McLeod, mechanical engineer, conducted the experiments which covered a half-year's operation of both the starter and propeller at the Fokker Aircraft Corporation, Hasbrouck Heights, New Jersey. Tests were also conducted recently by Col. Arthur C. Goebel at the Aero Corporation of California Flying Field in Los Angeles.

LOUGHEAD BROTHERS FORM NEW FIRM

THE Loughead Brothers Aircraft Manufacturing Corporation, Ltd., has been incorporated in California by Allan and Malcolm Loughead. Officials of the new company include William G. McAdoo, Allan Loughead, Malcolm Loughead, Fulton W. Hoge, G. Sadler, Ray Acre, Edward F. Andrews, Lawrence W. Scudder, J. L. Maddux and Earle P. Halliburton. The Lockheed Aircraft Company, with which the Loughead brothers were originally connected, was acquired early this year by the Detroit Aircraft Corporation, and the Loughead brothers retired from the management.

BOWLUS COMMENDED FOR SAIL-FLYING ACHIEVEMENTS

W. H. BOWLUS, president of the Bowlus Sailplane Company of San Diego, Calif., has received a citation for distinguished service in the cause of the American glider movement from the National Glider Association, Detroit, Michigan, and has been awarded a three-star insignia which the Association grants to first class glider pilots. This is the second three-star insignia which has been awarded by the Association to American sail-fliers.

Mr. Bowlus is holder of the American official record of one hour, 21 minutes and 9 4-5 seconds established in a sailplane of his own design at Point Loma, Calif., on October 19, 1929. Mr. Bowlus is affiliated with the Airtech School of Aviation, San Diego, Calif., in an advisory capacity and is an organizer of the San Diego Glider Club.

On December 3, Mr. Bowlus made a soaring flight of one hour, 26 minutes, 25 7-10 seconds in an improved model Bowlus sailplane at Point Loma. The velocity of the wind did not exceed fifteen miles an hour at any time during the flight and he was

(*Continued on next page*)

YOURS FOR GREATER SAFETY DURING 1930

NATION-WIDE SERVICE!

Dealers and service stations conveniently located

NOT CONTENT with merely producing aerial life-saving equipment of unusual merit, this company has also established nation-wide Dealer and *Service* organizations for the convenience, comfort and safety of flyers everywhere.

Schooled by Direct Factory *Flying Representatives* who have visited every major airport in the last few months, Russell "Lobe" Parachute *Sales and Service Representatives* at 100 airports and aerial supply stores are now prepared to give you quick delivery, expert service and helpful information on the parachute that has been adopted as standard flight equipment by veteran flyers, air transport companies, flying schools and aerial passengers the world over. . . . . *The parachute that has never failed to open in an emergency and bring its load safely to the earth.*

Have you seen the latest Russell Parachute pack? It fits right into the seat of the airplane. With this new pack you fasten and unfasten the parachute harness while seated in the cockpit--just as you do the safety belt! It's very convenient, simple--and remarkably comfortable.

Ask about the Russell "Lobe" Pongee Silk Parachute selling at $275. Other models, $250 or $350, F. O. B., San Diego or New York.

Descriptive Folder and Name of Nearest Service Station on Request

Russell Parachute Company
1202 Kettner Blv'd San Diego, Calif.

EASTERN SALES OFFICE:
122 East 42nd Street
New York City.

For owners of

RUSSELL "LOBE" PARACHUTES

(Continued from preceding page)

forced to land when the wind velocity decreased to less than five miles per hour. The flight was made in accordance with the specifications of the National Aeronautic Association and the Federation Aeronautique Internationale. The sailplane used in the flight has a wing spread of 60 feet and a weight of 175 pounds.

CALIFORNIA

THE name of the Los Angeles Municipal Airport has been officially changed by the City Council of Los Angeles upon the recommendation of R. B. Barnitz, Los Angeles director of airports, to the Los Angeles Airport. This change of name was necessary to eliminate confusion with other airports, Mr. Barnitz explained. The Los Angeles Airport has a railroad siding designated by the Santa Fe Railroad as Lamairport.

SAM C. BREDER has joined the Simmons Aircraft Division of Steel Incorported of Los Angeles, Calif., in the capacity of vice president, according to a recent announcement of Thomas J. Simmons, president. Mr. Breder was formerly sales manager of the Lockheed Aircraft Corporation.

AN addition of 800 miles will be added to the land and air transport systems in Mexico of the Pickwick Corporation of Los Angeles, Calif., as the result of the inauguration of new lines of the company which were to be effected by January 1, according to a recent announcement. The plans include the establishment of a tri-weekly air mail, express and passenger service between Mexico City and Acapulco by way of Pueblo.

Rearrangement of the schedules of the Pickwick Latin American Airways tri-weekly air mail, express and passenger line to provide two-day flying time between San Diego and Mexico City instead of three days, has been announced by Thomas E. Morgan, general manager of Pickwick Airways, Inc. The new schedule provides for one over-night stop at Los Mochis, Sinaloa, between San Diego and Mexico City. The over-night stop at San Diego has been eliminated, and the start of the two-day flight will be made from Los Angeles under the new schedule.

COINCIDENT with the second anniversary of initial commercial operation by Standard Airlines, Inc., on November 28, a total of 661,000 miles had been flown by planes operated by the company, according to a recent announcement of Standard officials. During the past year, Standard Airlines has extended its service to El Paso, Texas, and increased its schedule to a daily service between El Paso and the Pacific Coast. It also replaced its entire fleet of planes with trimotored transport ships. Standard Airlines, Inc., inaugurated an air-rail service on February 4, 1929, with the Texas & Pacific Railway, providing transcontinental air-rail transportation service.

W. H. BOWLUS, head of the technical training department of the Airtech School of Aviation, Lindbergh Field, San Diego, Calif., recently resigned to devote his time to the interests of the Bowlus Sailplane Company of which he is president. Mr. Bowlus will continue his affiliation with the Airtech school in an advisory capacity.

H. E. Morrow, a former welding instructor at the school, has been appointed manager of the technical training department of the Airtech school. Cyril Smith, a recent graduate of the Airtech ground school has been appointed instructor for primary welding classes.

The Airtech School of Aviation has announced the appointment of Herbert A. Thompson as an instructor in the Airtech woodshop classes. Mr. Thompson is a former woodshop foreman for the Mahoney Aircraft Corporation.

CONSTRUCTION of a passenger airplane with a wing-spread of more than 100 feet has been started by the Emsco Aircraft Corporation of Downey, Calif. The plane is being built in the new $1,000,000 plant of the Emsco Corporation which has been operating during the past five months.

The Emsco plane will accommodate 32 passengers, two pilots and a radio operator. It will be powered with four engines and will have a cruising speed of over 100 miles per hour.

THE Axelson Aircraft Engine Company recently opened its new plant at State and Randolph streets in Huntington Park, Los Angeles, Calif. While the plant is as yet not fully equipped, production has been increased. Officials of the Axelson organization took an active part in the All-Western Aircraft Show.

AN Emsco Cirrus monoplane was recently flown from the Emsco Airport, Downey, Calif., to the Oakland, Calif., airport, a distance of 350 miles, in three hours and 45 minutes, using 18 gallons of gasoline. John Guglelmetti, test pilot for the Emsco Aircraft Corporation, piloted the plane which averaged a fuel consumption of 4.8 gallons per hour on the flight.

E. G. BARBER, JR., has been appointed sales representative of the Lockheed Aircraft Corporation of Burbank, Calif., a division of the Detroit Aircraft Corporation. Mr. Barber, who will represent the Lockheed company in the Los Angeles district, served in the Army Air Corps during the World War.

California Aerial Transport Flying School at Los Angeles

A PROGRAM of general expansion of organization and equipment was recently started by the California Aerial Transport Flying School located at the Los Angeles Airport, Los Angeles, Calif. Arrangements have been completed for the construction of a building 160 feet by 120 feet, two stories in height, to accommodate the ground school equipment and administration offices of the school. The California Aerial Transport Flying School was approved by the Department of Commerce on August 29, 1929, to give flying and ground school courses leading to private, limited commercial and transport pilots' licenses in combination with the Western College of Aeronautics, which is also located at the Los Angeles Airport.

The private course given by the California Aerial Transport Flying School includes 25 hours of ground school work and 20 hours of dual and solo flying instruction. The ground school instruction comprises the study of aerodynamics, navigation, aircraft construction, aircraft engines, and air commerce regulations. Dual instruction in the rudiments of flying is given and includes take-offs, landings, simple turns and banks. After passing a check of his work, the student is then allowed to solo. The limited commercial course includes the same ground school instruction given in the private course with the addition of fifty hours of advanced flying, dual and solo. A minimum of 100 hours of ground school work is included in the transport pilot's course. Two hundred hours of flying instruction is given and covers the flying instruction given in the limited commercial course with the addition of the more advanced phases of flying, such as night and cross-country flying and advanced work in open cockpit and cabin flying. Students in the transport pilot's course have the option of as much additional instruction in the ground school as they desire.

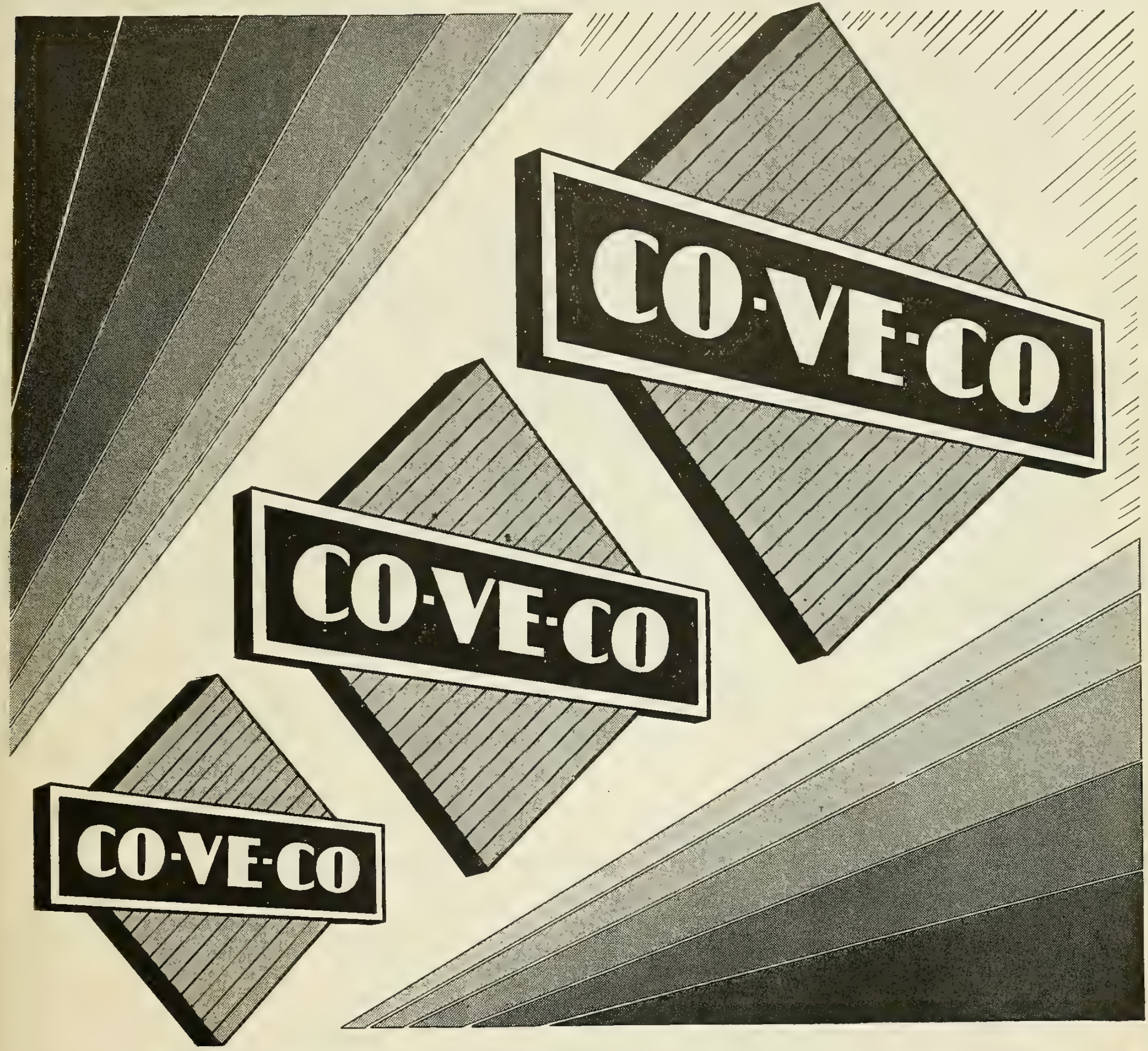
Primary flying training at the California Aerial Transport School of Flying is given in three Travel Air three-place biplanes powered with OX-5 engines. Advanced flying instruction is given in Whirlwind Travel Air and Whirlwind Eaglerock biplanes. Cabin plane flying instruction is given in a Whirlwind Stinson Detroiter with stick control, and a Whirlwind Stinson Detroiter six-place cabin plane with dep control. A Lockheed Whirlwind Vega is used to give cross-country flying instruction.

CONSTRUCTION of a passenger depot at the Valley Boulevard terminal, Los Angeles, Calif., by Western Air Express has been practically completed and was to be ready for occupancy and operation by January 1. The building, designed for the use of air travelers and the operating personnel of the company, was constructed at a cost of $100,000. It is a four-story brick structure.

The first floor will house the accommodations for passengers, and contains glass-enclosed quarters for the chief dispatcher. There are also ticket offices, baggage rooms and a restaurant on the ground floor. The second floor will be occupied by officials of the Weather Bureau of the Department of Commerce. On the third floor will be the offices of the radio department which will include the personnel and equipment of the

(Continued on next page)

SITKA SPRUCE AND PORT ORFORD CEDAR



BOTH ARE CO-VE-CO

THE CO-VE-CO trademark is suggestive not only of quality aircraft plywood manufactured from Port Orford Cedar. It is, as well, the identification mark of aircraft plywood manufactured from carefully selected Sitka Spruce . . . As in the case of Port Orford Cedar, due to the exclusive CO-VE-CO method of manufacture, Sitka Spruce may be peeled to your most exacting precision limits in thickness, and to your own specification in sheet sizes...Veneers for both CO-VE-CO aircraft plywoods are peeled from the cold log just as it comes from the forest. Neither wood is subjected to steaming or cooking processes to soften the log before peeling. Thus, in both woods, the natural full strength stored by nature through centuries of growth is preserved intact in the finished product. Plan now to use CO-VE-CO aircraft plywoods in your 1930 production. Samples of both woods will be mailed upon request. You are invited to correspond with our Sales Representatives relative to the manufacture of plywoods to your specifications for thickness and sheet sizes.

PORT ORFORD CEDAR PRODUCTS COMPANY
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Exclusive Sales Representatives
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H. B. MARIS PANEL CO.
735 3rd Street
San Francisco

(California News continued)

operating and experimental divisions. The offices of the company officials will be located on the fourth floor which has been constructed in the form of a cupola giving unobstructed view of the 188-acre flying field where planes of Western Air Express arrive and take off.

A concrete platform designed in the shape of a parabola is located in front of the depot on the east side and adjacent to the oiled runways. Passengers will emplane and deplane at this platform. Future plans include the construction of similar platforms on two other sides of the depot to care for increased traffic. Extending over the walk leading from the boulevard to the west entrance of the passenger depot a canopy has been erected.

Airtech Training School at San Diego

THE Airtech School of Aviation maintains its own training field, known as Airtech Field, at San Diego, Calif., for the exclusive use of students. The airport is located seven minutes by air from Lindbergh Field where Airtech has its headquarters and gives flight instruction. The dedication of Lindbergh Field on August 16, 1928, marked the inception of the Airtech school, and on July 15, 1929, the Airtech School of Aviation was approved by the Department of Commerce to give ground and flight training for private, limited commercial and transport licenses.

The flight-training curriculum given at the Airtech School of Aviation is divided into three stages: primary, intermediate and advanced. For each of these stages a definite training routine has been developed. The personal element of instruction is followed and each student, during his primary course of instruction, has only one flight instructor. All student flight training is under the supervision of Douglas T. Kelley, manager of the flight training division, a graduate of Kelly Field and a rated Army pilot. Earle Mitchell, chief flying instructor, served as an Army combat instructor during the War.

The airplanes used for flight training are classified in four types: primary, advanced, small cabin and large cabin. All the training planes of a given type are identical to maintain standardization of equipment. Exact flight schedules are maintained at Lindbergh Field. These schedules are prepared one week in advance and are followed closely.

All flying instruction during primary training is given with the Gosport communicating helmet. This period of training covers primary dual instruction leading up to the student's first solo flight and the first ten hours of solo flight. The primary course of training includes level flying, banks, spirals without power, take-offs and landings, spins and figure eights. Commercial and transport students receive thirty hours of intermediate training and the course includes instruction in vertical banks, turns, acrobatics, forced landings, cross-country flights and closed cabin flying. Students in the transport pilot's course receive 150 hours in the advanced training stage. The course given includes advanced cross-country, instrument flying, night flying and navigation flights.

The curriculum in the ground school division includes lecture courses, shop and laboratory work. The course of instruction includes aerial navigation, meteorology, engines, aircraft construction, aerodynamics, airport management, parachutes and airplane maintenance.

Airtech Field includes 434 acres. It is completely lighted for night flying and has two runways 3,000 feet in length.

Los Angeles Airport Celebrates First Anniversary

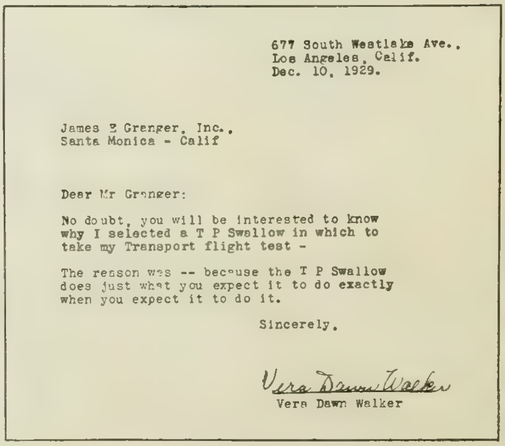
AN air meet was included in the ceremonies held at the Los Angeles Airport on December 15 in commemoration of the first anniversary of the flying field. Eighty-one planes based at the port participated in the meet in addition to visiting ships.

The field, formerly known as the Los Angeles Metropolitan Airport, was dedicated on December 17, 1928, during ceremonies which included the commemoration of the Wright brothers' 25th anniversary of the first flight of man. When the airport was inaugurated two buildings had been constructed at the field, an administration tower and one hangar. Ten major structures are now located at the field, three factories, six hangars, and smaller units occupied by planes operated by oil companies.

(Continued on next page)

Swallow Training Plane Used Exclusively

by Eleventh Girl Pilot on Her Transport Flight Test



677 South Westlake Ave.,
Los Angeles, Calif.
Dec. 10, 1929.

James E Grenger, Inc.,
Santa Monica - Calif

Dear Mr Granger:

No doubt, you will be interested to know why I selected a T P Swallow in which to take my Transport flight test -

The reason was -- because the T P Swallow does just what you expect it to do exactly when you expect it to do it.

Sincerely,

Vera Dawn Walker
Vera Dawn Walker

Sold and Distributed on Pacific Coast

By

J. E. GRANGER, Inc.

Clover Field, Santa Monica, Calif.

Manufactured by

SWALLOW AIRPLANE CO., Wichita, Kansas

It will pay you to train THIS WINTER *with*

RYAN

In sunny

SAN DIEGO, CALIFORNIA

Because:

1. The man who trains here during the coming *warm* Winter months will be prepared to enter aviation next Spring.

2. Summer time is always aviation's busiest season--(get ready for next Summer NOW and you'll gain an extra season of pay and experience).

3. San Diego, California, is America's outstanding Summer and Winter Resort--356 Flying Days is the annual average.

4. While other sections of the United States are snow-bound, Ryan students thrill to the comfort and joys of perfect flying weather--and the experience of training in 15 licensed planes, large and small, open and closed, of the most modern types.

5. The T. C. Ryan Flying School was one of the first to receive the COMPLETE approval of the U. S. Dept. of Commerce for training Transport, as well as Limited Commercial and Private pilots.

6. Ryan ground training is outstanding for its thoroness--offering 400 hours of theoretical and practical training (more than four times the minimum requirements for the U. S. Dept. of Commerce Transport License).

7. Ryan Flying and ground instructors are of the highest type, men who are masters of their particular professions. Seven ground instructors are employed for technical training alone.

8. Ryan Airport, serving three huge transport companies with 12 to 15 tri-motor planes on daily schedules, gives Ryan students unexcelled opportunities for contact with major aeronautical activities.

9. The Government's largest navy and army aviation base, near Ryan Airport, gives additional educational advantages to Ryan students.

10. Employers recognize and prefer graduates from a school with many years of experience and an established reputation for quality training. Ryan reputation is recognized internationally.

LEARN AVIATION with RYAN

HIGHEST RATING U. S. DEPT. COMMERCE *Approved*

NOTE: All training at the Ryan Flying School is given under the personal supervision of T. Claude Ryan, original designer and builder of Ryan monoplanes; founder of Ryan Airlines, Ryan Flying Company; president of T. C. Ryan Flying School and T. C. Ryan Aeronautical Corporation.

THIS COUPON WILL BRING YOU OUR NEW CATALOG

The T. C. Ryan Flying School invites the attention of those who are interested only in the highest standards of aeronautical training. Ryan Approved Training costs less than training at some schools that have not been approved.

Courses include:

**The Transport Course*	*200 Flying Hours*		*Refresher Courses for Wartime Pilots*
**The Commercial Course*	*50 Flying Hours*	*Also*	*and those who have had flight training*
†*The Private Pilot's Course*	*20 Flying Hours*		*at other schools.*

**These courses include 400 hours of Ground School with Lectures, Laboratory and Shop Practice.*
†*The Private Pilot's Course includes 200 hours of Ground School Training.*

T. C. Ryan Flying School, Dept. H, Ryan Airport. San Diego, California. Please send me your illustrated catalog.

NAME ________ ADDRESS ________ AGE ________

(*California News continued*)

THE Courier Monoplane Company of Long Beach, Calif., has developed and placed on the market a three-place cabin plane and an open-cockpit training plane. All parts of these models are made in jigs and control surfaces are interchangeable, according to an announcement of the Courier company. Public demonstrations of the cabin and the training plane have been made at the field of the Aero Corporation of California at Los Angeles.

J. B. WOODSIDE has been appointed director of publicity for the Curtiss-Grand Central Air Terminal at Glendale, Calif. Mr. Woodside was formerly editor of the *British-American Magazine*, London, England, and was a member of the staff of the New York *Evening Post*.

ASSOCIATED AIRCRAFT, INC., has been appointed distributor in the Southwest of the Student Prince biplane manufactured by the Aircraft Builders Corporation of Portland, Oregon. Associated Aircraft, Inc., recently moved its organization to Angeles Mesa and Exposition Blvd., Los Angeles, Calif.

APPROXIMATELY 200 students of the Broadway High School, Glendale, Cal., have begun a course of instruction in ground work and aeronautical engineering at the Curtiss-Grand Central Airport at Glendale. The course includes weekly lectures on the principles of flying and airplane construction, and instruction in safety devices and measures, which are given under the direction of Prof. Morgan N. Smith.

OAKLAND

[HOWARD V. WALDORF]

VARIOUS civic organizations have endorsed the proposed Pacific Coast Aeronautical Exposition, planned to be held in Oakland during the last week of February. William P. Butler has been appointed chairman of the arrangements committee by the Capt. Bill Erwin Post of the American Legion.

GEORGE B. HEGARDT, airport manager of Oakland, has been appointed to a nation-wide committee of the Aeronautical Chamber of Commerce of America to study airport management, standards and ethics. Serving with Hegardt in the Pacific Coast area is Waldo Waterman, manager of the Los Angeles Metropolitan Airport.

THE Federal aerological service in the region of the Sierra Mountains has been increased. The expansion program was planned by D. M. Little of Oakland Municipal Airport, head of the Federal upper-air weather reporting service on the Pacific Coast. The additional service includes a teletype circuit connection joining the Oakland airport, Sacramento, Auburn, Summit, Truckee and Reno. Stations off the regular airways have been established at Yuba and Echo Summit Passes.

The teletype station at Summit, located at an altitude of 7,350 feet, and overlooking California and Nevada, is said to be the highest of its kind in the world. The station house is located on the top of a boulder 200 feet high, with cables fastened into the stone to form the foundation. During the winter months the station will be isolated by the snow. Two observers are to be on duty at the station, furnishing hourly reports, similar to those furnished from other airway stations. In addition, the observers will be called upon to check each plane passing overhead.

WITH the opening of new classes in January, the student enrollment at the Boeing School of Aeronautics at Oakland Muncipial Airport is expected to increase to more than 150. The new classes are to be for the master pilot and master mechanic courses. The flying equipment of the school has been increased to nine planes, including two cabin planes. Additions to the faculty include Maj. E. H. Bowie, district weather forecaster for the Federal Government; Maj. T. R. Reed, World War flier; D. M. Little, head of the Federal aerological service on the Pacific Coast; and Lieut. Allen Bonnalie, former Royal Air Force flier.

Maj. Bowie, Maj. Reed and Mr. Little head the staff of the school's meteorological course, which includes weather chart making, and instruction in the causes of good and bad flying weather. Lieut. Bonnalie is instructor of the gas engine course.

ALAMEDA

[HOWARD V. WALDORF]

EXECUTIVE offices of the Curtiss-Wright Flying Service, northern California branch, have been established in the administration building at Alameda Airport. The offices were formerly located in San Francisco. Capt. Harry Claiborne is in charge.

UNDER the direction of Capt. F. M. Bartlett development work on the Curtiss Airports Corporation's $5,000,000 program in the San Francisco Bay area is being rushed to completion. The program includes Alameda Airport and an instruction field at San Mateo. At the Alameda airport workmen are engaged in completing a fill which will triple the acreage of the flying field, and in surfacing the reclaimed portion. Work is also under way on a $300,000 yacht harbor and seaplane base on the west edge of the flying field. This project is expected to be completed by spring.

WORK is being rushed on the $1,000,000 air terminal being constructed by the San Francisco Bay Airdrome on the west Alameda tidelands. The flying field is to be used by the Western Air Express. Surfacing on the landing area is now nearing completion, and the construction of hangars and an elaborate airplane depot is to start shortly. Hexagonal hangars are to be constructed.

ARIZONA

[HAROLD G. WILSON]

A MODEL airplane club has been organized at Tucson, Arizona, under the name of the "Flying Fools" and activities will include the construction and flying of model planes. This club is the third model airplane club which has been organized at Tucson. The Tucson Glider Club has obtained its own glider flying field near the city where a clubhouse and a hangar will be constructed by the members. Present plans of the club include the purchase of a glider.

SCENIC Airways, Inc., Phoenix, Ariz., which is owned by United Aviation, has been completely reorganized. Lloyd Weeter, formerly with the Boeing Air Transport Company, of Chicago, has succeeded J. E. Kintner as general manager of the company. Charles Goldtrap has been promoted to the office of chief pilot. E. V. Graham is traffic representative and John Harrison is in charge of the flying school. Among the contemplated expansions of the company is a regular passenger line from Phoenix, center of the company's operations, through Tucson to Nogales, which may later be extended to Hermosillo, Mexico. Oiling of the Phoenix Sky Harbor, the company's airport, is included in development plans for the year.

LIEUT. LESLIE ARNOLD, round-the-world flier, is president of the newly formed Union Airways into which the Aero Corporation of Arizona, the Southwest Air Service, and other companies have merged.

The company plans to operate a north-south line from the border through Tucson, Phoenix and Prescott to Winslow, making connections with the T. A. T. line in the north and Standard Airlines in the south.

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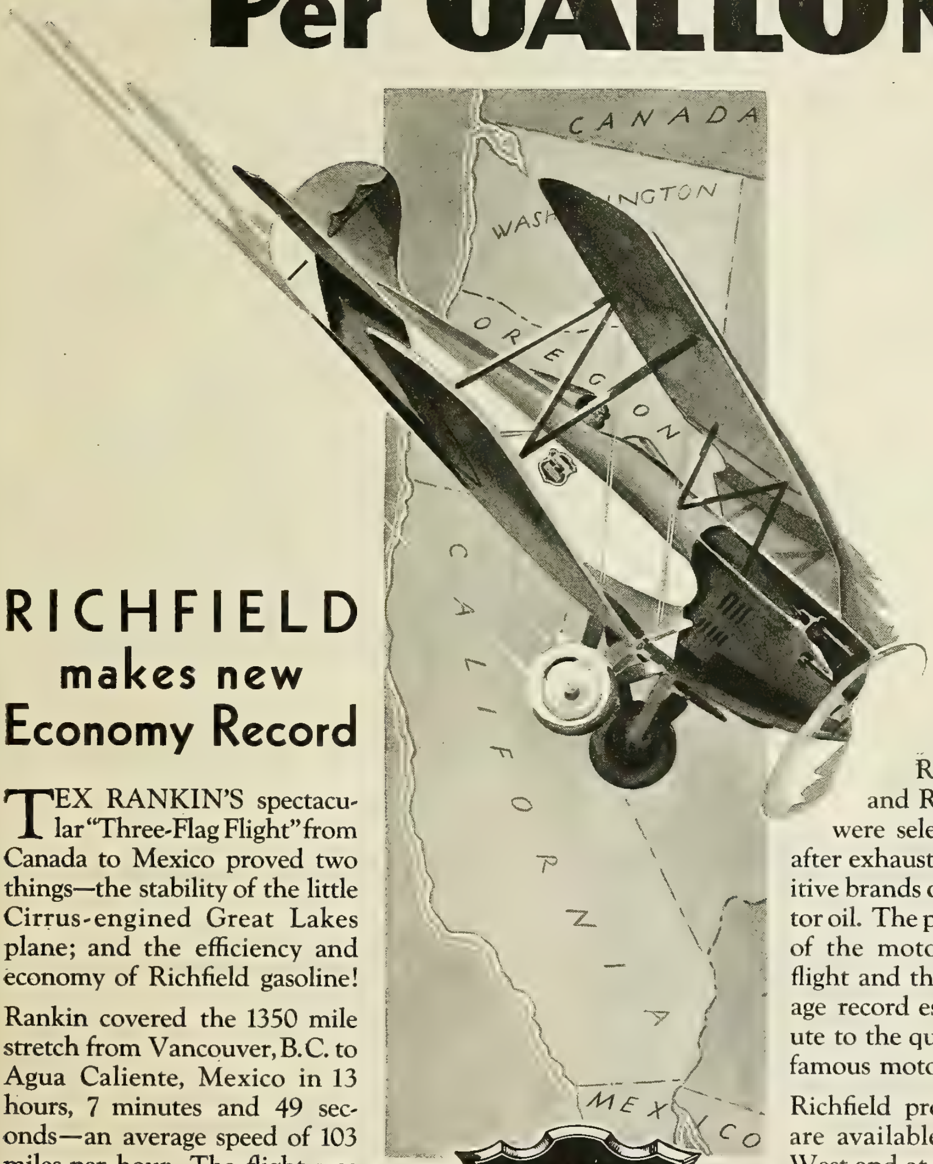
Factory of the Lockheed Aircraft Corporation at Burbank, California

18⅓ Air MILES Per GALLON



RICHFIELD makes new Economy Record

TEX RANKIN'S spectacular "Three-Flag Flight" from Canada to Mexico proved two things—the stability of the little Cirrus-engined Great Lakes plane; and the efficiency and economy of Richfield gasoline!

Rankin covered the 1350 mile stretch from Vancouver, B.C. to Agua Caliente, Mexico in 13 hours, 7 minutes and 49 seconds—an average speed of 103 miles per hour. The flight was officially sanctioned and supervised by the Federation Aeronautique Internationale and the National Aeronautic Assoc'n.

Richfield Gasoline and Richlube Motor Oil were selected for the flight after exhaustive tests of competitive brands of gasoline and motor oil. The perfect performance of the motor throughout the flight and the remarkable mileage record established is a tribute to the qualities of these two famous motor products.

Richfield products and service are available throughout the West and at many points in the East and Mid-West. Use Richfield and Richlube in your flying equipment for maximum performance.

RICHFIELD
AVIATION
GASOLINE

RICHFIELD

(Arizona News continued)

AJO, mining camp in the southwestern part of Arizona, has been named a U. S. Customs Airport, being the second point along the Arizona-Mexico border so designated. Ajo has long been a regular port of entry for persons and freight, the new order merely extending authority to pass on international air traffic. Nogales has been U. S. Customs port for some time, and is now used regularly by Pickwick Latin-American Airways.

A REGULAR air passenger and express service between the Miami-Globe district and Phoenix, Ariz., was inaugurated November 23, by the Apache Air Lines, Inc. A trimotor Kreutzer flies two round trips daily, leaving Midland Field at 8:10 a. m. for Phoenix Sky Harbor, starting the trip return at 9:10 a. m. and leaving again at 3:10 p. m. for Phoenix with the second return trip, starting at 4:10 p. m.

Midland Field serves both Miami and Globe, and is being developed by the joint efforts of both communities. It was officially dedicated December 7.

A BRANCH airline from Douglas, Ariz., to Nacozari, Sonora, Mexico, is contemplated, following a visit there of representatives of Standard Airlines, Inc., which now operates a daily service from Los Angeles to El Paso with Phoenix, Tucson and Douglas as stopping points. Mining companies and municipal officials in Nacozari are interested in the project and are already clearing a field at Purice, seven miles north of Nacozari. Supt. B. R. Russell, of the Douglas International Airport, accompanied the company representatives on the trip into Mexico. The airline would reduce traveling time from three and a half hours to 40 minutes.

A REORGANIZATION of Scenic Airways, Inc., of Phoenix, Ariz., has been effected and Lloyd Weeter, formerly of Boeing Air Transport, has been appointed manager, according to a recent announcement of the company. Scenic Airways will center activities during the winter and spring seasons at Phoenix Sky Harbor, under the management of John Harrison and Charles Goldtrap. The company operates airplane passenger service, using twenty-one planes.

CANAL ZONE

[J. F. H.]

WIDE interest is being shown in the aviation course recently inaugurated by the Isthmian Airways Company, transcanal airway operators in the Canal Zone, the first class numbering sixteen. The students are being drilled in the fundamentals of engines and the theory of flight by Captain John Miller, chief pilot of the company. As soon as floats for the training plane arrive the first air work will begin.

Since May 5th, the Isthmian Airways have made more than 950 flights across the Canal Zone. During that time no plane in the service has been forced down by mechanical defects and on one occasion only has bad weather caused a plane to land. The Hamilton all-metal seaplanes which are used have carried over 3,000 passengers and 75,000 pounds of freight since that date. The company operates a tri-daily service. More than 800 single trips have been flown across the Panama Canal from May 5 to December by Captain John H. Miller, chief pilot for the Isthmian Airways, Inc.

THE Panamian National Aviation Commission recently announced that the Scadta Company of Colombia, which has been operating its planes into the Canal Zone and Panama for several months, has been given a contract by the Panama government. The Scadta planes will fly over a regular course entering and leaving the Republic of Panama and the Canal Zone.

PAN AMERICAN AIRWAYS has secured permission from the Panama government to erect hangars and offices at the Patilla Point Airdrome in Panama City and at David, Panama. The structures will be built at a total cost of $25,000. The Panamian Government is also considering erecting hangars and facilities for offices and shops in these cities.

PASSENGER service between the Canal Zone and Florida, linking Nicaragua, Spanish and British Honduras and Cuba

(Continued on next page)

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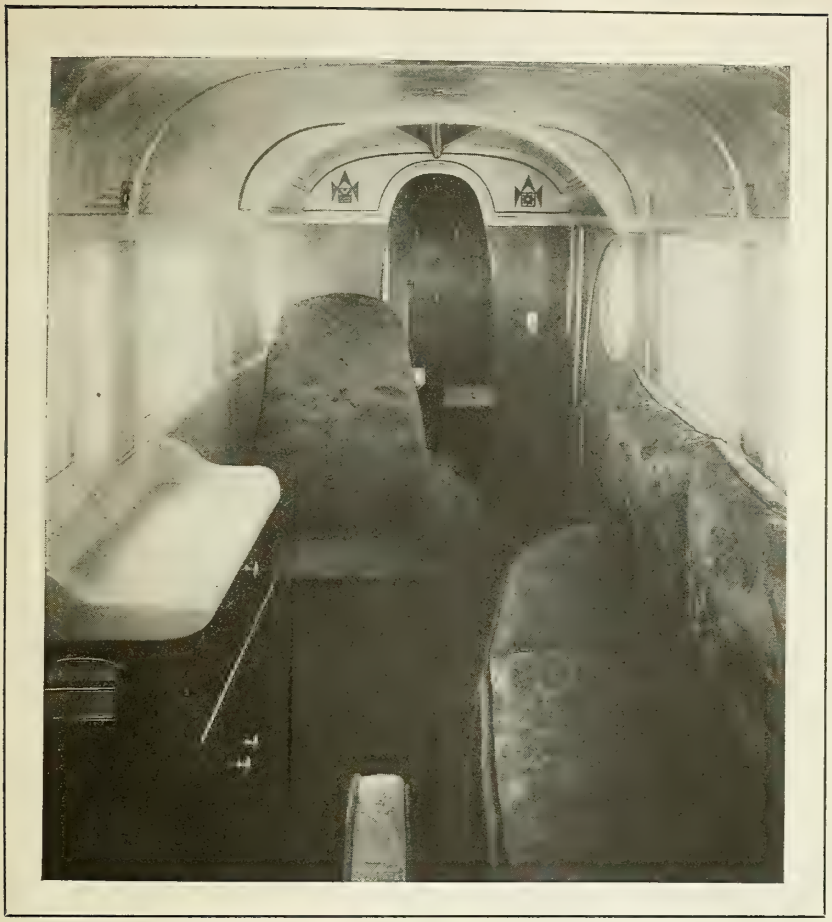

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(*Canal Zone News continued*)

with the United States, was inaugurated December 21 by Pan American Airways. The run requires three days, and over-night stops are made at Managua, Nicaragua, and Belize, British Honduras, arriving in Miami on the afternoon of the third day after leaving the Canal Zone.

THE U. S. Naval Radio Station at Puerto Obaldia, Panama, 200 miles down the Atlantic coast from Colon and only a few miles from the Colombian frontier, sends out weather reports twice a day which aid commercial aviation between South America and the Canal Zone immeasurably. Every plane that flies over Obaldia is recorded by the station and its position and direction is radioed to the Panama government.

COLORADO

[IRA R. ALEXANDER]

PLANS for extending the U. S. Airways, Inc., service from Denver to Wichita and Oklahoma City were announced recently by officials of the company. Daily flights to these points were to start January 1, in addition to the present Denver-Kansas City service.

Stockholders of the company held a meeting during the past month and the following were elected to the new board of directors: W. A. Letson, Fred P. Murphy, F. D. Martin, Dr. H. L. Meyers, H. F. Steen, B. D. Bridges, and C. P. Munns. Mr. Letson was re-elected president, F. A. Conway was reelected secretary-treasurer, and Mr. Bridges was elected vice president. The same administrative personnel was retained—composed of J. M. Knappenberger, general traffic manager; F. C. Wahlenmaier, Jr., division traffic manager, and George E. Halsey, manager of operations.

Colorado American Legion Sponsors Airports

IN an effort to encourage the construction and operation of airports in cities and towns throughout Colorado and to assist in the promotion of aviation in general, the state department of the American Legion recently started the formation of a state committee on aeronautics, of which Ralph J. Hall, assistant manager of the Denver branch of the Curtiss Flying service, was appointed chairman. The appointment of the committee is part of a civic program to be carried out by the American Legion during the coming year.

Mr. Hall was given authority by the legion to name other members of the committee. The purpose of the committee will be to aid cities and towns throughout Colorado in the development of aviation. A member of each legion post throughout the state will serve on the committee, which will work in conjunction with a city committee to be named in Denver. Mr. Hall will visit every city and town in the state in an attempt to learn just what steps are being taken in the various communities toward the development of aviation and the construction and operation of airports. One of the chief aims of the newly formed committee, according to Mr. Hall, will be to act in an advisory capacity in the proper construction and operation of small airports and landing fields.

PLANES, field and buildings of the 120th Observation Squadron, Colorado National Guard, were officially approved recently, following an inspection of the Lowry Field, Denver, unit by Capt. William E. Lynd of the inspection division, office of the Chief of Air Corps, Washington. The unit, under command of Maj. Bruce Kistler, is one of the finest in the entire nation, Capt. Lynd said.

Alexander Aircraft Employee's Recreation Association

THE Employees' Recreation Association of the Alexander Aircraft Company is an organization of Alexander Aircraft employees formed to sponsor recreational activities among the workers in the aircraft factory. The revenue producing activities of the association cover not only the sale of confections, soft drinks and tobaccos, but also include washing, greasing and gassing of automobiles. So extensive are these activities that the association employs two salaried men to be in charge of them. From the profits accruing, recreational activities are financed.

The commissary of the association is located near the main gate. It carries a complete stock of sweets, drinks and smokes as well as items of aeronautical equipment, such as goggles and helmets, for the convenience of local and visiting fliers. A gasoline service is maintained as well as a grease pit and wash rack. The service of the grease pit and the wash rack is available to the general public, but gasoline is sold only to company employees. The greasing service is practical and of assistance to the factory workers inasmuch as they may have the service performed while they are at work and their cars are ready for them at quitting time.

UTAH

[GLEN PERRINS]

BOEING AIR TRANSPORT, Inc., plans to construct a radio station at Salt Lake City in the near future as part of its communication system for pilots flying ships on the Boeing system. Several other stations will be constructed along the line at distances of approximately 200 miles.

Passenger travel over airlines operating out of Salt Lake City will be greatly increased with the placing of large passenger planes in operation on the Boeing Air Transport line to Chicago, and the Varney lines to Portland, according to Gilbert Rich, manager of the Salt Lake Airport. The air mail tonnage on these lines is showing a marked increase. Over one-third of all the air mail carried in the United States is handled by air transport lines which operate through Salt Lake. Increased business on the Salt Lake-Los Angeles route of the Western Air Express has made it necessary to call the trimotored twelve-passenger planes back into service, P. O. Lee, Western Air Express traffic agent, reports. Bids for the operation of an air mail line between Salt Lake, Elko, Nevada, and the Uintah basin will be submitted in the near future by Whitney Parry, manager.

PLANS to erect a repair depot at the Salt Lake Municipal Airport were recently announced by Frank P. Bell, general manager, of Aircraft Industries, Ltd., of Oakland, California. The plans call for construction of a depot, completely equipped for repair service, plane reconstruction and sale of airplane parts.

OGDEN, Utah, recently let a contract to the Graybar Electric Company for $3,287 worth of lighting equipment for its field, and an additional $1,000 for installation. This city will have a standard lighted field. It has already installed a large revolving beacon.

MAIL-PASSENGER planes on the Chicago-Oakland-San Francisco routes, through Cheyenne, Wyoming, having radiophone apparatus to permit voice communication between pilot and the ground will also be equipped to receive directive radio beacon service, maintained at points on the air network by the Department of Commerce, according to an announcement of S. A. Stinson, traffic agent of the Boeing system. Boeing Transport is now making tests at Casper, Wyoming, with mobile weather radio stations.

IDAHO

[IDA M. DURNIN]

CONTRACT work for the improvement of the municipal airport at Boise, Idaho, has been completed and the airport has been officially accepted by the city council. The work included the clearing, grading and leveling of the flying field, and the development of ten acres of land adjacent to the airport which the city council recently purchased in addition to 115 lots to provide a runway of 4,800 feet for the future development of the field.

The improvement of the municipal airport at Boise was made possible by a $78,000 bond issue authorized by the taxpayers on June 6. The contract for the work was awarded to Ryberg, McHugh and Crowley and included, in addition to the development of the airport, the improvement of the branch of the Snake River which borders the city. The contract involved a total cost of $70,000.

The construction work on the Boise airport included the placing of 85,850 cubic yards of gravel upon the runways, the hauling and placing upon the runways of 20,000 cubic yards of sand, the construction of 450 feet of sewer, and the clearing and grubbing of the field. The street department of the city aided in the work of removing trees and other obstructions and in leveling

(*Continued on next page*)

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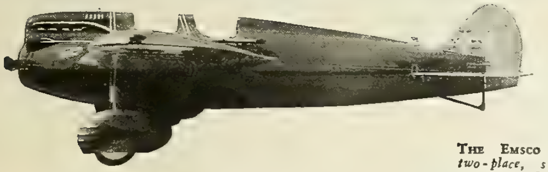
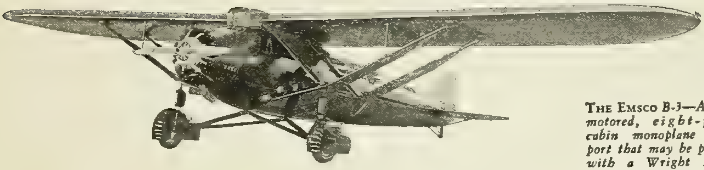
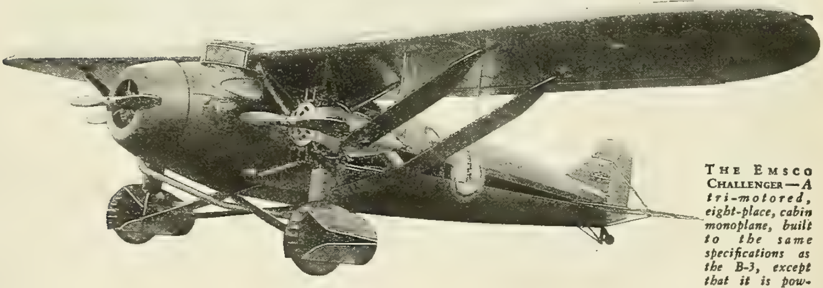


THE EMSCO CIRRUS—*A two-place, sport and training, mid-wing monoplane, powered with a 95 h.p., four-cylinder, air-cooled American Cirrus motor.*



THE EMSCO B-3—*A single motored, eight-place, cabin monoplane transport that may be powered with a Wright 300, a Pratt & Whitney Wasp or Hornet engine.*



THE EMSCO CHALLENGER—*A tri-motored, eight-place, cabin monoplane, built to the same specifications as the B-3, except that it is powered with three Curtiss Challenger engines of 170 h.p. each.*

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The Emsco Cirrus has flown cross-country under normal flying conditions with a fuel consumption of only 4.8 gallons per hour at cruising speed. Twice the B-3, powered with a 300 h.p. Wright Whirlwind has taken off a gross load of approximately 10,000 pounds with a run of a half mile. The Emsco Challenger has demonstrated its dependability, safety and economy by flying more than 25,000 miles, under all conditions, within the last four months.

In addition to these, the Emsco Aircraft Corporation has under construction four new and distinctive types of planes, which, when completed and added to the present group, will make the Emsco line one of the finest and most complete in the industry today. These four include (1) a four motored plane carrying thirty-two passengers, two pilots and radio man; four Wasp motors—tandem; designed for all weather conditions and altitude flying, also offering economical transportation. (2) The Emsco Amphibian—a bi-motored eight place, streamline; metal designed; built for heavy duty transportation. (3) The Emsco Mail—a single motored monoplane; built for mail, express and freight; fast performance with a pay load of 1,200 pounds. (4) A special long range monoplane—extremely streamlined; designed for record distance flight.

All Emsco land planes are delivered from the factory with pontoon fittings so that no structural changes are necessary to quickly adapt them to seaplane work. The B-3 may easily be transformed into a tri-motored plane as fittings for outboard motors are standard. Structurally the planes are identical. Complete specifications, performance data and prices will be forwarded on request

EMSCO AIRCRAFT CORPORATION . DOWNEY . LOS ANGELES COUNTY . CALIF.

(*Idaho News continued*)

portions of the airport which were not included in the contract.

The east-west runway of the Boise airport is 3,800 feet by 300 feet, and the cross runway is approximately 1,800 feet long by 300 feet wide.

A LEASE has been signed by the airport committee of the Moscow, Idaho, chamber of commerce for 85 acres of ground to be given to the city to be used as a municipal flying field.

CYRIL C. THOMPSON, chief deputy state auditor for Idaho during the past seven years, resigned recently to become tax expert for the Boeing Air Transport, Inc., of Seattle. Mr. Thompson has been active in aeronautical organizations in Idaho for two or three years and is Idaho's representative on the board of governors of the National Aeronautic association.

ARRANGEMENTS have been made for the winter carrying of mail, express and passengers into the Meadow Creek Mining Camp of the Yellow Pine Company by airplane. George Stonebraker will operate the venture which will require an hour's flight from Cascade, Idaho, to the camp.

JOE WOOD, head of the Idaho State Department of Public Works, was recently elected head of the Western States Aeronautical Association at Los Angeles. The association was formed at the request of the United States Chamber of Commerce and the Federal Government to draft air laws for the Pacific Coast and Mountain states. Nine states were represented at the Los Angeles meeting.

[GLEN PERRINS]

GRADING work at the Idaho Falls, Idaho, Municipal Airport has been completed at a total cost of $1,800. A runway constructed at the landing field is 450 feet long and extends the entire length of the field. Lighting equipment is planned.

WORK of clearing the Burley, Idaho, airport is now in progress, and preparation of runways for grading will soon be completed. Ultimately it is proposed to lengthen the runways to 5,000 feet each and to join them at the ends, forming a triangle. Space has been left along the highway for hangar construction. Border lights will soon be installed.

ARTHUR BLOMGREN, state aeronautical engineer, recently completed a preliminary survey of the proposed Idaho state airway mail route branching from the National Parks Airways route at Idaho Falls and extending through the Lemhi Valley to Salmon City. The proposed route is across flat country which insures safe emergency landings at practically all points. Airports are located between Mountain Home and Boise on the Salt Lake-Pasco route and between Idaho Falls and Dubois on the National Parks Airways route between Salt Lake and Butte. A contract recently let by the government to the Varney Company extends the air mail route to Portland and Seattle from Salt Lake City.

NORTHWEST

[F. K. HASKELL]

THE city of South Bend, Wash., has let a contract for the construction of a hangar at Willapa Harbor Airport. The site of this field is on the Ocean Beach highway and is easily accessible to the city.

AN air field was recently dedicated at Moscow, Idaho. Two runways have been completed, one of 1,900 feet and one of 2,100 feet.

VERN C. GORST, pioneer air mail operator on the Pacific Coast, is to serve as director and actively participate in operating management of Air Ferries, Ltd., at San Francisco. The air ferry firm is to operate a flying boat service between San Francisco and Sacramento river points, using the river for landings.

THE United States Department of Commerce is installing ceiling-light equipment at the Salem, Ore., airport. An alidade will be installed to measure the ceiling as spotted with a 4,000,000-candlepower light. Other ceiling lights will be installed at Oregon City, Castle Rock and Chehalis, Wash. A 2,000,000-candlepower revolving airway beacon has been installed at Myrtle Creek, Ore., which is on the Seattle-San Francisco airplane route.

LIGHTING bids were opened at Portland, Ore., on December 19th, for nine beacons and field floodlights for the four fields on the Spokane-Pasco air mail route which is covered by the Varney Air Lines. Beacons are to be located at 15-mile intervals along the route, while landing lights will be installed at intermediate fields located at Cheney, Sprague Lake, Lind and Connell.

WASHINGTON

[C. M. LITTELJOHN]

CAPITALIZED at $25,000, the Kelso Airport was incorporated recently at Kelso, Washington. Those named as directors of this new corporation which will govern the air-field are A. F. V. Davis, J. A. Pringle and C. D. Rarey.

A NEW inter-city airline, established by Don Phillips began operating a passenger service between Seattle and Wenatchee with a stop at Yakima, on December 15th. Government data has disclosed there are but sixteen days during the year when flying is unsafe over the Cascade mountains and it is expected that once established a regular schedule will be maintained on the line.

A FIFTY-THOUSAND dollar hangar and a system of floodlights which cost $20,000 are being installed as finishing touches to the $300,000 airport of Tacoma, Wash. L. E. Wilkeson, of Tacoma, has been named supervisor of the airport.

A NEW undercarriage which has been developed in the main factory of the Boeing Airplane Company of Seattle, for use on planes over snow-bound divisions of the Boeing transcontinental air route, has been

(*Continued on page* 154)

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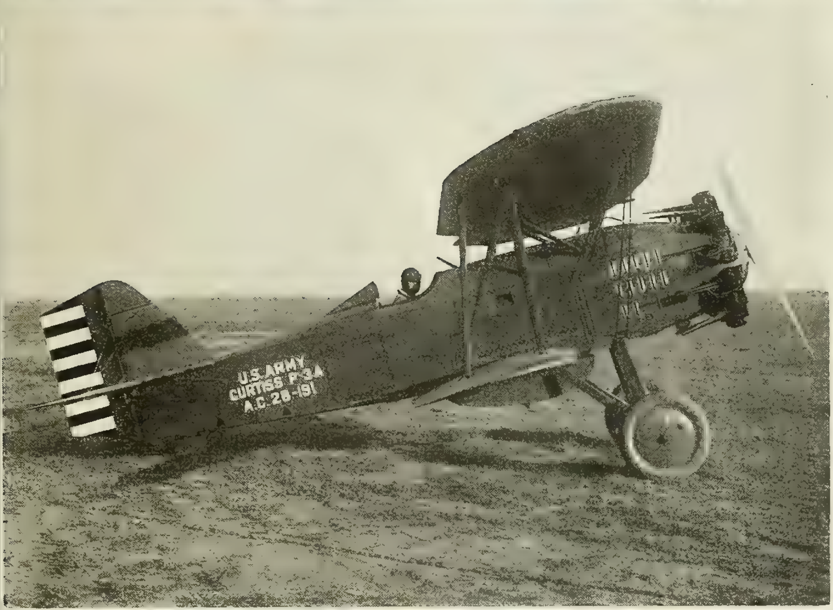

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(*Washington News continued*)

named "Snowphibion." Specially slotted skis are attached to regular landing wheels to form the new undercarriage, so that planes may alight or take off with ease on either snow or bare ground.

A FLOATING air terminal is being erected by the Gorst Air Transportation Company at Seattle. This terminal will be designed for the accommodation of the air ferries operated by the firm, and will provide waiting room for passengers as well as hangar space and a machine shop. As soon as it is completed it is to be placed at the foot of Madison St., Seattle. The terminal will consist of two floors, and will house four amphibion planes. New planes are to be bought by the Gorst company and an extension of its ferry lines is planned for next spring.

A NEW device which, it is claimed, will permit an airplane pilot to determine his position instantly has been invented by James M. Mack, of Houghton, Wash. The Mack radio air pilot has been inspected by Lieut. Commander P. V. H. Weems, U. S. N., an executive officer on the U. S. S. *Cuyama*, and an authority on aerial navigation, who stated that the new device will probably be one of the most important aids to aerial navigation. In the new invention of Mr. Mack a map mounted on a turntable is operated in conjunction with a rotatable loop aerial, which, once the map is adjusted to the course of the plane, is trained successively on two distant broadcasting stations. Response from each broadcasting station indicates the distance from these points.

DIRECT daily air service from Seattle to Vancouver, B. C., was inaugurated recently when a Lockheed Vega seaplane, piloted by A. V. Holden, vice president of the Alaska-Washington Airways, took off from Lake Union, Seattle. A daily schedule of the triangular air flight is now maintained, from Seattle, to Vancouver, thence to Victoria, and back to Seattle.

THE new factory of the Boeing Aircraft of Canada at Vancouver is now in production on a fleet of Boeing six-place flying boats. The planes are powered with Wasp engines shipped from the new Pratt and Whitney plant at Longueuil, Quebec. Boeing mail and passenger planes of the 40-B series have also been placed in production, and at the first of the year work was to be started on the new three-place ship, developed by Boeing engineers for training school operation.

These last named planes have been slightly re-designed for Canadian conditions. The chief change is the incorporation of a universal landing gear which may be equipped with wheels, floats or skis. Canadian aircraft operate for nearly four months a year on skis, and many use floats during the rest of the year.

In addition to carefully sounding out the Canadian market, the Vancouver unit is conducting a thorough survey of Australian and New Zealand flying requirements, preparatory to an advertising and sales campaign to be started in April, which is the Australian autumn.

HAWAII

[VERNE HINKLEY]

THE Hawaiian Airways, the second commercial airline operating company to establish itself in the Hawaiian Islands, is waiting for its Fokker trimotor equipment. One Kreutzer aircoach, powered with three Warner engines, is being used. The ship has made a number of flights to the islands of Molokai, Maui and Hawaii and has several times transported Governor Lawrence M. Judd on inspection trips. Two Fokkers and three Kreutzers will be used by the company.

Commander George O. Noville, who flew with Richard Byrd across the Atlantic, has arrived to become the operations manager for Hawaiian Airways. D. M. Cornell, who has been with the Standard Airlines in California, is in Hawaii as chief pilot for the company. Other pilots for the company are George Cerveny and Harvey F. Bolton. Fiske Stubbins and Austin Shreve are Hawaiian Airways mechanics.

LIEUT. DARR H. ALKIRE, Air Corps, has obtained leave of absence from the Army and is temporarily with the Inter-Island Airways, flying their two Sikorskys and their Bellanca Pacemaker. He will resume his duties with the Army as soon as his leave has expired. The two other Inter-Island Airways pilots are Lieut. Carl A. Cover, Air Corps, and C. I. Elliott, formerly with the Naval Air Station at Pearl Harbor.

DEVELOPMENT of the John Rodgers Airport, Honolulu's municipal flying field, is proceeding rapidly. The Inter-Island Airways hangar is completed and has been occupied several weeks. The Hawaiian Airways hangar is nearly finished. Water, electricity and telephone are now available at the field. The roadway leading into the port from the main highway has been hard-surfaced and an asphalt runway has been laid on the field proper. The cross-wind runway has a top dressing of ground coral. The territorial government has started an administration building to be occupied by field officials. The field itself is undergoing a salt water treatment, after which it will be rolled to harden the surface. It is hoped that this will eliminate dust.

NEW DOUGLAS flying boats have begun to arrive at the Pearl Harbor Naval Air Station. The ships are powered with two Wright Cyclone engines, which develop 525-horsepower each. The boats will replace the craft with which the station has been equipped.

COMMANDER VICTOR D. HERBSTER staged an aerial show for Honolulu on Navy Day when he sent a fleet of 27 Naval aircraft across the city in formation. The Naval aviators have been practicing night flying in formation.

Luke and Wheeler Fields are to get more enlisted men, an additional force of 132 to be divided between the two stations having been authorized.

ARMY surveyors have started work checking the proposed field near Fort Kamehameha for which Congress has authorized the expenditure of $623,000. When the port is completed the Army will abandon its share of Luke Field to the Navy.

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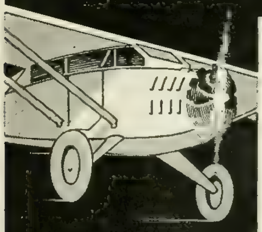

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AERONAUTICAL INDUSTRY

DEP'T. OF COMMERCE REPORTS ON AERONAUTIC ACTIVITIES

THE Department of Commerce is contributing materially to the development of civil aeronautics and its nation-wide network of air transport lines for use in time of peace, and to the creation of a powerful aerial defense reserve for use in case of war, according to the annual report of the Aeronautics Branch of the Department of Commerce. This advancement, Major Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, says in the report, will provide employment for a constantly increasing percentage of the population, will speed the movement of men, money, mail and merchandise, and will decrease the cost of distribution, thereby increasing the purchasing power of the consumer's dollar. By reducing the necessity for keeping large sums of money tied up in slow-moving merchandise, and by aiding in numerous ways to speed up commerce and industry, the further development of air transportation will lower the cost of transacting business materially throughout the Nation, Major Young stated.

The activities of the Aeronautics Branch during the past fiscal year include the following fields of work: inspection and licensing of aircraft; examination and licensing of airmen; identification of aircraft; establishment and enforcement of air traffic rules and regulations; investigation of aircraft accidents; assembly of data pertaining to aeronautics; establishment and maintenance of civil airways; equipping of airways with suitable intermediate landing fields, beacon lights, radio apparatus and other aids to aerial navigation; maintenance of comprehensive airway weather service; charting of airways; publication of air maps; conduct of scientific research and development work to create and improve air commerce facilities; rating of flying schools; publication of the *Air Commerce Bulletin;* encouragement of municipal airport construction; rating of airports; issuance of detailed data on individual airports; collection and dissemination of air commerce information; and general promotion of air commerce, industry, and trade.

The report shows that aids to air navigation established and operated by the Department of Commerce during the fiscal year ended June 30, 1929, included 10,183 miles of lighted airways, 263 intermediate fields, 6,300 boundary lights, 1,455 obstruction lights, 881 twenty-four inch revolving beacons, 518 flashing beacons, 45 upper air weather stations, 110 weather bureau stations, 54 airways division weather stations, 27 radio communication stations, 7 radio beacons and 8 radio marker beacons. The 1929 appropriation of $4,689,550 was expended for the establishment of aids on 4,266 miles of airways; 17 different airways were included in this mileage, on all of which air transport companies are operating on regular schedules requiring night flying (all or part of the time) over the entire section lighted. At the close of the fiscal year 1929, 13 experienced airplane pilots, 10 civil engineers and 5 airplanes were engaged in surveying airways. Four electrical and structural engineers and 18 inspectors of airway construction were engaged in the establishment of lighting equipment. Six radio engineers, 2 construction engineers, and 12 radio electricians were engaged in experimental work, construction of radio stations, and installation of apparatus. Twenty airway engineers, 72 airway mechanicians, and 782 caretakers and attendants were employed in the maintenance of airways.

Department of Commerce approvals and licenses in effect December 2, 1929

Airplane licenses	6,482
Airplane identifications	3,109
Approved type aircraft	271
Approved type engines	32
Approved type propellers	134
Pilots' licenses active	9,279
Mechanics' licenses active	7,196
Students' permits	28,738
Approved flying schools	24
Flying instructors approved	88
Ground instructors approved	129

Department of Commerce approvals given during 1929

Approved type airplanes	121
Approved type engines	21
Approved type propellers	28
Airplanes approved without Approved Type Certificate	65
Airplanes approved without Approved Type Certificate	13
Total approvals in 1929	248

During the past fiscal year, the Air Regulations Division issued a total of 42,338 licenses, license renewals, title transfers and export certificates—as against 14,083 for the previous year. Pilots' licenses issued increased over the preceding year 95 per cent; pilots' licenses renewed, 480 per cent; permits issued for students, 491 per cent; aircraft licenses issued, 153 per cent; identification marks assigned, 145 per cent; mechanics' licenses issued, 16 per cent; export certificates issued, 90 per cent, and transfers of title completed, 141 per cent. During the year this division granted 121 Approved Type Certificates for airplanes; 21 for engines; and 28 for propellers. In addition, 65 different types of planes were examined and approved without being granted Approved Type Certificates, and 13 types of engines were approved on the same independent basis. The total number of approvals granted to airplanes, engines and propellers during the fiscal year amounted to 248—which is about three and one-half times the amount of work handled during the previous year. The number of physical examinations certified for pilots and student pilots increased from 11,688 during 1927-28 to 28,153 during 1928-29. The number of Department of Commerce medical examiners increased from 366 to 704.

According to Major Young's report, lighted airways have increased from 2,041 miles in 1926 to 4,468 miles in 1927 to 6,988 miles in 1928; total airway mileage

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has increased from 8,404 in 1926 to 9,122 in 1927 to 16,667 in 1928; mail carried has increased from 810,355 pounds in 1926 to 1,654,000 pounds in 1927 to 4,063,173 in 1928; passengers carried have increased from 5,782 in 1926 to 8,679 in 1927 to 49,000 in 1928; miles flown have increased from 4,318,087 in 1926 to 5,870,489 in 1927 to 10,673,450 in 1928. Totals for the calendar year 1929 are estimated as follows: lighted airways, 12,500 miles; total airways, 35,000 miles; mail carried, 8,000,000 pounds; passengers carried, 85,000; miles flown, 16,000,000.

Through its Aeronautical Research Division in the Bureau of Standards, the Branch has contributed largely to the development and improvement of aids to air navigation and to the promotion of safety and comfort in flight. Work accomplished by this division in coöperation with other units of the Department of Commerce during the year includes research on radio aids, investigations on airways and airport lighting, wind tunnel research, methods for reducing airplane noise, investigation of the strength of airplane joints and fittings, and type-testing of aircraft engines.

The work of this division is resulting in better service to the aeronautic industry in a guaranty to the public of higher standards of airworthiness, in approved aircraft and in competent licensed pilots.

PLANS DEVELOPED FOR ST. LOUIS SHOW

ORGANIZATION of the International Class A Aircraft Exposition, sponsored by the Aeronautical Chamber of Commerce at St. Louis, Mo., February 15-23, is in full swing under the supervision of Clifford W. Henderson, manager of the show section of the Aeronautical Chamber of Commerce. Space for 250 exhibits of aircraft, engines and accessories will be provided by the $2,000,000 St. Louis Arena, where the exhibition will be held.

The exhibits will be housed in two wings of the building extending from the central part of the arena, and will include displays arranged by air transport lines in addition to those of aircraft, aircraft engine and equipment manufacturers. An elaborate pageant portraying the evolution of transportation from its beginning to the modern developments in aviation will be staged in the central building of the St. Louis Arena. Arrangements are being made to provide an aerial taxi service from the field adjoining the exposition buildings to the airports in and adjacent to St. Louis.

The St. Louis Exposition will be the only Class A show sponsored or sanctioned by the Aeronautical Chamber of Commerce during 1930, according to Charles L. Lawrance, chairman of the Chamber's show committee. This is in conformity with the policy adopted by the committee for one national or international exposition a year, two or three Class B regional shows, and such local Class C shows as the committee deems profitable to the advancement of the industry and its promotion of interest in aviation.

SCHEDULE OF COMING AERONAUTIC EVENTS

January 13, 14, 15. Miami All-American Air Meet, Miami, Fla.

January 13. Aeronautical Meeting of the Society of Automotive Engineers, Miami, Fla.

January 21. Aeronautical Meeting of the Society of Automotive Engineers, Detroit, Mich.—Aeronautical session at annual meeting of S. A. E.

February 7-15. Second Annual New York Aviation Show, Aviators Post No. 743, American Legion, New York City, N. Y.

February 15-23. International Class-A Aircraft Show, St. Louis, Mo.

March 6-15. Second Annual Pittsburgh Aircraft Show, Pittsburgh, Pa.

March 26-April 1. First Cincinnati Aviation Show, Music Hall, Cincinnati, Ohio. (Date changed from February 8-15)

April 5-13. Third All-American Aircraft Show, Detroit Board of Commerce, Detroit, Mich.

April 8-9. Two-day meeting of S. A. E. during Detroit Aircraft Show.

May 3-10. New York Aircraft Show, Aeronautical Chamber of Commerce, Madison Square Garden, New York City, N. Y.

September 1-6. Fifth International Air Congress, The Hague, Holland.

November 27-December 14. Aeronautical salon, Paris, France.

Grover Loening

GROVER LOENING HEADS NEW FIRM

ANNOUNCEMENT was made recently of the resignation of Grover Loening as consulting engineer and director of the Keystone Aircraft Corporation and director of the Curtiss-Wright Corporation. Mr. Loening, who founded and was formerly president of the Loening Aeronautical Engineering Corporation which developed the Loening amphibion, relinquished that position last year when his company was merged with the Keystone Aircraft Corporation and later with the Curtiss-Wright Corporation.

Mr. Loening will devote his entire time to the recently incorporated Grover Loening Company of which he is president and chief engineer. This company, capitalized at $1,000,000, will specialize in the development of new and advanced designs of aircraft under contract for both the Government and private manufacturing companies. A new laboratory, equipped for the construction of advanced engineering designs, has been established at 305 East 46th Street, New York City, and is now in operation on several developments in the aircraft field.

Starting in 1914 as assistant to Orville Wright, Mr. Loening is one of the oldest and most experienced engineers in the aeronautic industry. In 1920 he won the Collier Trophy for the development of the Loening Air Yacht. Later he invented and developed the Loening amphibion.

AIRCRAFT INSURANCE CLASSIFICATION

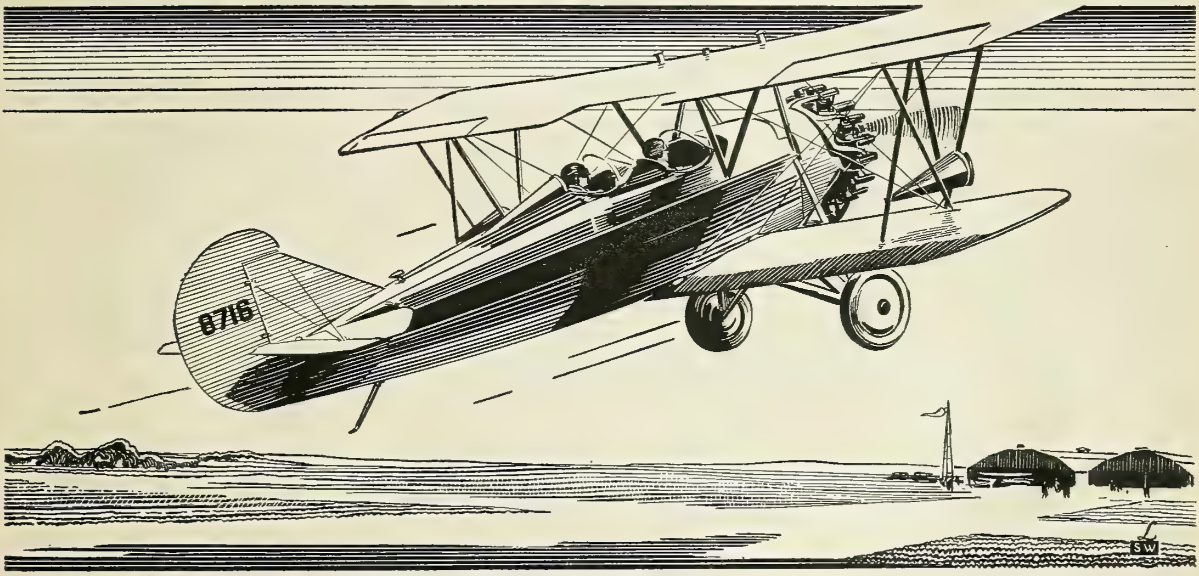
BARBER AND BALDWIN, INC., underwriters of aviation risks, in collaboration with L. B. Recording and Statistical Corporation and Aero Engineering and Advisory Service, Inc., has prepared a classification coding system for use in compiling aviation statistics for underwriting guidance.

The following is a summary of the Barber and Baldwin Classification Coding System. The entire business is first subdivided as formerly according to major coverages, embodying fire, accidental damage, tornado, theft, public liability, passenger liability, property damage, personal accident, compensation, etc. Each major coverage is then classified under seven separate codes—type of aircraft in combination with number of engines; age; use; ownership; manufacturer; list price; and geographical limits. The present plan provides for eight types of aircraft, sixteen different uses and four classes of ownership.

The classification of loss code indicates the character of claims presented and the common causes under which most of them may be grouped, following closely the method of analysis recommended by the National Advisory Committee for Aeronautics. All losses are first segregated according to the nature of the accident with respect to the policy coverage, the more important groupings being as follows: fire, lightning, transportation, accidental damage, windstorm or tornado, theft, pilferage, damage to ground property, liability and personal accident.

The cause of each accident is classified under three major headings subdivided as follows: personnel—errors of pilot, errors of supervisory personnel and errors of other personnel; material—power plant failure, structural failure, failure of controls, handling qualities and instruments; miscellaneous—weather, darkness, airport or terrain, failure of fuel supply, overloading, and miscellaneous. Each loss is further classified according to the experience of the pilot involved in the accident.

HOPPING OFF FOR THE 23RD YEAR OF U. S. AIRPLANE TIRES



At the controls is no 10-hour pilot, but a veteran of 22 years. 22 years of building tires expressly for aircraft—of working for aviation—of co-operating with designers, engineers and pilots—of giving to aviation the experience and the economies of a worldwide tire-building organization. In no business, today, does experience mean more than in flying. So if you buy as you fly—not on hopes but on the sound knowledge of experience—you will appreciate more than ever what U. S. tires have always meant in promoting safe, economical flying. United States Rubber Company—World's Largest Producer of Rubber

U.S. ROYAL AIRPLANE TIRES

FLYING SCHOOL APPROVALS INCREASE

TWENTY-SIX schools throughout the United States giving ground and flying instruction have been approved by the Department of Commerce, according to a recent report of Department officials. The schools received Approved School Certificates following examinations of their organizations, equipment and instructors by inspectors of the Federal Department. The Department of Commerce has adopted the practice of examining and approving schools in an effort to identify those schools providing facilities deemed adequate according to standards established by the Department.

The schools approved subsequent to those reported as having received Approved School Certificates in the December issue of AERO DIGEST are: Universal Aviation School, in combination with Universal Flying School, Minneapolis; Curtiss Flying Service of Indiana, Indianapolis; Universal Aviation School, Memphis; Garland School of Aeronautics, Tulsa, Okla.; Wolf Flying Service, Williamsport, Pa.; and Curtiss Flying Service of the South, Memphis, Tenn.

The flying and ground schools in the country now approved by the Department of Commerce are as follows:

Approved Schools and addresses	*Ratings for which approved*
Airtech Training School, Airtech Field, San Diego, Calif.	Transport Lim. Commercial Private
Standard Flying School, 9401 S. Western Ave., Los Angeles, Calif.	Transport Lim. Commercial Private
Embry-Riddle Flying School, Lunken Airport, Cincinnati, O.	Transport Lim. Commercial Private
Parks Air College, Parks Airport, E. St. Louis, Ill.	Transport Lim. Commercial Private
D. W. Flying Service, Le Roy Airport, Le Roy, N. Y.	Lim. Commercial
T. C. Ryan Flying Service, Ryan Airport, 3300 Barnet Avenue, San Diego, Calif. In combination with Pacific Technical Univ.	Transport Lim. Commercial Private
Universal Flying School, Wold-Chamberlain Field, Minneapolis, Minn.	Transport Lim. Commercial Private
Curtiss Flying Service, Valley Stream Airport, Valley Stream, L. I. In combination with New York University.	Lim. Commercial Private
Universal Flying School, Lambert Field, St. Louis, Mo.	Transport Lim. Commercial Private
Curtiss Flying Service, Grosse Ile Airport, Grosse Ile, Mich.	Transport Lim. Commercial Private
California Aerial Transport Flying School, L. A. Airport, Los Angeles, Calif. In combination with Western College of Aeronautics.	Transport Lim. Commercial Private
Curtiss Flying Service of the Middle West, Fairfax Airport, Kansas City, Kan.	Transport Lim. Commercial Private
Porterfield Flying School, Fairfax Airport, Kansas City, Mo.	Transport Lim. Commercial Private
Von Hoffman Aircraft School, Lambert Field, Robertson, Mo.	Transport Lim. Commercial Private
Curtiss Flying Service, Oakland Airport, Oakland, Calif. Ground School at 1258 Russ Building, San Francisco, Calif.	Transport Lim. Commercial Private
Curtiss Flying Service of the Middle West, Curtiss Reynolds Airport, Glenview, Illinois.	Transport Lim. Commercial Private
Boeing School of Aero., Oakland Airport, Oakland, Calif.	Transport Lim. Commercial Private
Spartan School of Aero., Apache Blvd. and Chamberlain Drive, Tulsa, Okla.	Transport Lim. Commercial Private
Curtiss Flying Service, L. A. Airport, Inglewood, Calif.	Transport Lim. Commercial Private
Roosevelt Aviation School, Roosevelt Field No. 1, Mineola, L. I.	Transport Lim. Commercial Private
Univ. Aviation School, 344 N. Exchange St., St. Paul, Minn. In combination with Universal Flying School Wold-Chamberlain Field, Minneapolis, Minn.	Lim. Commercial Private
Curtiss Flying Service of Indiana, Stout Field, Indianapolis, Ind.	Lim. Commercial Private
Univ. Aviation School, Memphis Muni. Airport, Memphis, Tenn.	Lim. Commercial Private
Curtiss Flying Service of the South, Memphis Muni. Airport, Memphis, Tenn.	Lim. Commercial Private
Garland School of Aeronautics, 51st and Sheridan Rd., Tulsa, Okla.	Transport Lim. Commercial Private
Wolf Flying Service, Williamsport Airport, Williamsport, Pa.	Private

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BALTIMORE AIR SHOW A SUCCESS

By E. W. WALSH

BALTIMORE'S First Annual Aircraft Show, held during the week of December 9th at the Fifth Regiment Armory, Baltimore, Md., was a success financially and in the interest it aroused in aviation throughout the Baltimore district. More than 50,000 persons attended the event. The closing nights of the show were the largest, both passing the 13,000 mark established on the opening night. Despite the fact that several planes which were to have been entered had to be withdrawn at the last moment when they were held up by storms on the way East from the airplane manufacturers in the South and Middle West, Show officials announced that the continuance of the show as an annual event in Baltimore has been assured. Preparations for the 1930 Show will begin immediately, it was announced by Ray Krimm, who directed the show under the sponsorship of the Flying Club of Baltimore, and with the approval of the Baltimore Association of Commerce and the endorsement of the aircraft division of the Aeronautical Chamber of Commerce of America.

Elaborate lighting effects, including floodlights and revolving beacons, were arranged for the event, which added considerable to the exhibits. The Armory was brilliantly illuminated and decorated. A specially-designed ceiling with an aviation motif was used. Each day had some special feature and each day was designated to honor a person or concern.

The aircraft exhibited represented an approximate total value of $142,000. The planes shown at the show ranged in size and price from the Bellanca cabin monoplane to the Monoprep sport monoplane. The plane display included the complete line of the Fairchild Manufacturing Corporation, of Farmingdale, L. I., and the Kreider-Reisner Aircraft Co., Inc., of Hagerstown, Md., several of which were exhibited by Robert J. Stewart, the Fairchild representative in Baltimore. The Curtiss-Wright Flying Service, Inc., through Major

(*Continued on next page*)

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Railroad fare is refunded to students paying for 50 or more hours on arrival. References: Guaranty State Bank and San Antonio Chamber of Commerce.

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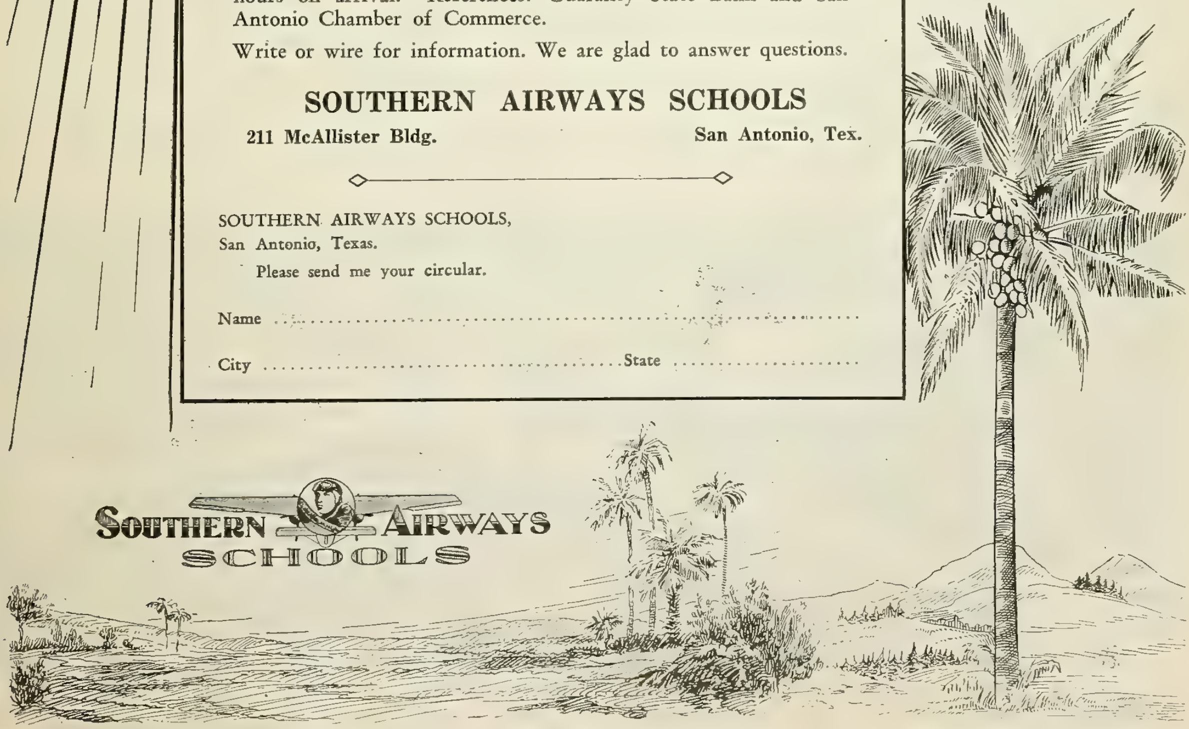

SOUTHERN AIRWAYS SCHOOLS

(Continued from preceding page)

William D. Tipton, general manager of the Baltimore office of the concern, was the largest single exhibitor in the show with an entry of nine planes manufactured by the various Curtiss subsidiaries and other manufacturers whom the Curtiss sales organization represents. Their exhibit included a Cessna monoplane; two Curtiss Robins; two De Havilland Moths; two Travel Air monoplanes; a Travel Air biplane and a Keystone-Loening Commuter. Other displays included the Travel Air "Mystery Ship"; two sport and training monoplanes entered by the Berliner-Joyce Aircraft Corporation of Baltimore; two two-place Doyle monoplanes of the Doyle Aero Corporation; a Verville Air Coach, owned by Henry du Pont; a Bellanca monoplane and a Brunner-Winkle Bird entered by Baltimore Airways, Inc., operators of the Baltimore-New York airline; a Monoprep of the Pilots' and Mechanics' Flying Club of Logan Field, Baltimore; a Savoia-Marchetti amphibion of the American Aeronautical Corporation; and a Consolidated O-17 and a Curtiss Falcon entered by the Maryland National Guard Aviation Unit.

In addition to the exhibits by aircraft manufacturers, booths were maintained by manufacturers of aircraft accessories and exhibits of lines closely allied to the aircraft industry.

Nearly 10,000 special air mail letters were carried from Baltimore by the Pitcairn Aviation, Inc., as a result of the special air mail cachet offered in connection with the show. More than 80 model planes were shown in the model plane exhibit staged in conjunction with the show.

Walter W. Bruns, general manager of the Miami All-American Air Meet

MIAMI ALL-AMERICAN AIR MEET

DURING January 13, 14 and 15, 1930, the second Miami All-American Air Races will be staged at Miami, Fla., and will celebrate the dedications of the new Curtiss-Wright hangar and administration building at the Miami Municipal Airport, the Miami Municipal Dirigible Airport, the Curtiss-Wright and the Viking Flying Boat Seaplane Bases, and the establishment of the New York, Rio and Buenos Aires Line in Miami. From January 7 to January 9, 1929, the first Miami All-American Air Races were held in Miami, Florida, and was the occasion of the dedication of the Miami Municipal and Pan-American Airways Airports.

For the first time Latin America and North America will compete in an air meet, $10,000 in cash money and many trophies and prizes being offered during the second Miami All-American Air Races. More than 350 planes are expected to take active part, and, since Miami will be at the height of the tourist season at that time, close to 200,000 spectators are expected to attend.

The following is the program as outlined by the Municipal Aviation Board:

Monday, January 13, 1930: Formal dedication of the Municipal Dirigible Airport. Mayor C. H. Reeder of Miami will give an address of welcome to Miami. This will be followed by an address of welcome to the State by Governor Doyle E. Carlton. Response to the addresses will be made by Mr. P. W. Litchfield, president of the Goodyear Zeppelin Corporation. The ceremony will be concluded by a review of the Goodyear blimps, air maneuvers by planes, and the inspection of the Municipal Airport and its hangar by guests. Races will be held in the afternoon, and in the evening a dinner will be given for the "Early Birds," followed by an informal dance.

Tuesday, January 14, will see racing events in the afternoon with an aviation and industrial dinner and dance in the evening.

On Wednesday, January 15, the final day of the meet, there will be the third program of racing and contest events, and, in the evening, the awarding of prizes and the Miami Aviation Ball.

In addition to the many races for all classes of planes, events will include parachute dropping, balloon bursting, bomb dropping, maneuvers by Army, Marine and Navy planes and exhibitions by service pursuit planes. Prizes will be awarded to the three neatest appearing ships.

The Curtiss-Wright hangar and administration building, which will include the ground and flying school of the organization in Miami, will have over-all dimensions of 143 feet by 147 feet and will be located on a portion of the Municipal Airport, the site of the All-American Air Races. The building includes in its plan ticket offices, telephone and telegraph equipment, an information booth, classrooms, an accessories sales department, and a library. Furnishings of the building will be in travitene, a high-light pastel shade plastering, and drapes, rugs and upholstering will be selected to match. The hangar will be the first in the country to be equipped with a solar heating system, and the hangar will include shower rooms and lockers for students and employees.

Three Goodyear blimps will be housed in the dirigible hangar at the Municipal Dirigible Airport for the winter and will take active part in the ceremonies of the dedication and in the Miami All-American Air Races. The hangar is 250 feet long, 150 feet wide and 90 feet high, and is being con-

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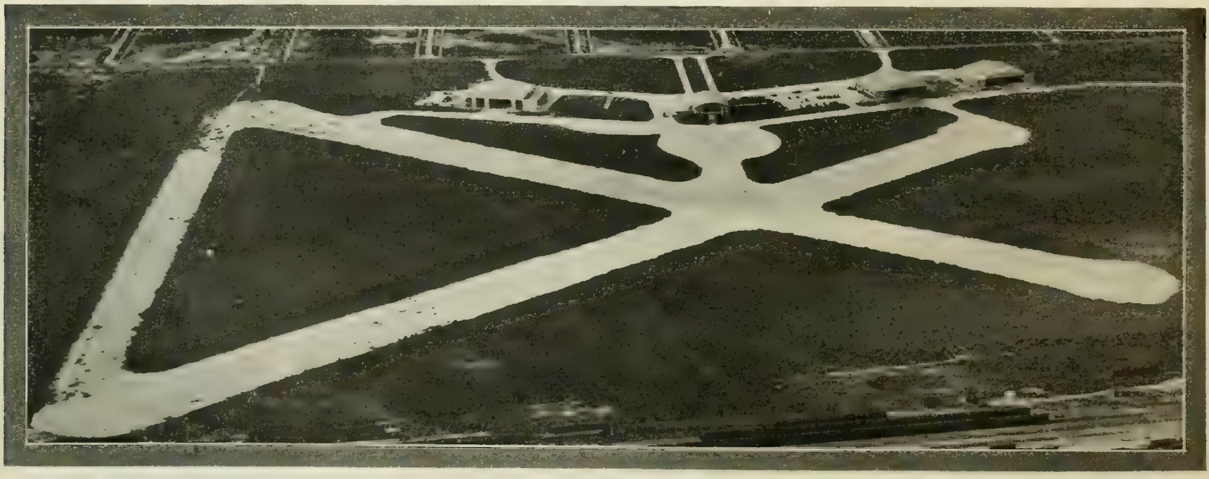
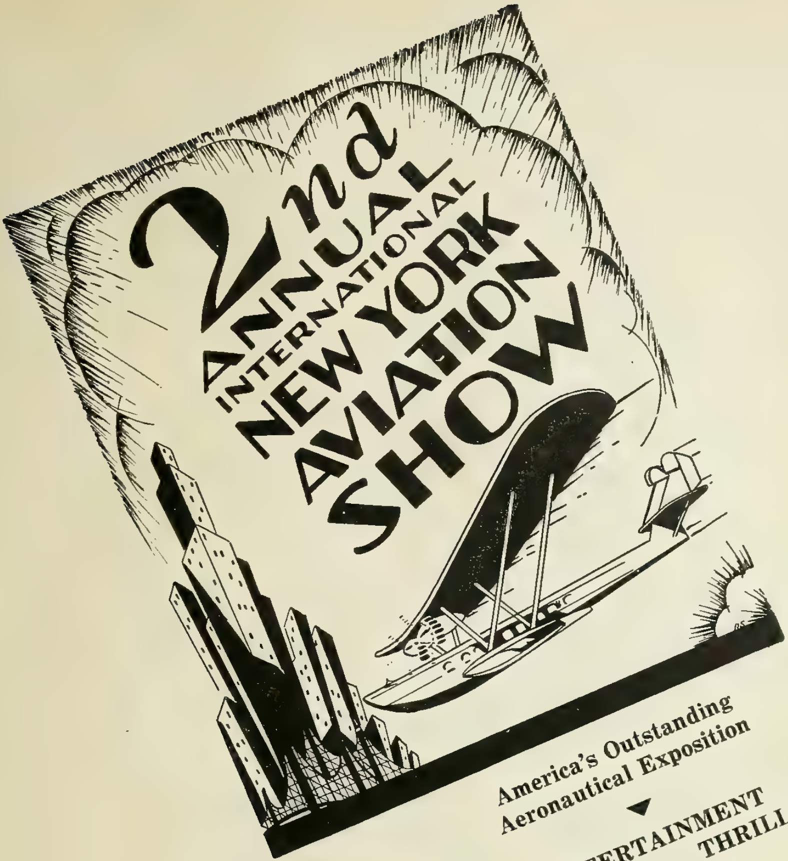


Pan American Airways Airport at Miami which was dedicated at the 1929 All-American Air Meet. This port is the terminal point for the firm's airlines to Latin and South America, and will be the scene of much activity during the 1930 All-American Air Meet



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(*Continued from preceding page*)

structed at a cost of $40,000. The dirigible airport is ten miles from Miami and two miles from the heavier-than-air field. It is located on excellent roads and includes a runway, 3,000 feet in length. A large complement of aeronautical engineers, mechanics, pilots and students arrived at Miami with the Goodyear blimps from the Goodyear Zeppelin Corporation at Akron, Ohio, to establish a base for winter maneuvers. These ships will be used for training pilots and crews for the United States Government, research and experimental work on lighter-than-aircraft, and are also for the use of public officials in making aerial studies and surveys. The activity of the airships will not be confined to Miami alone, but will take place over the entire state and adjacent areas. It is also possible that Miami may be a base for experimental cruises to Latin American countries.

The new Curtiss-Wright Seaplane Base on Biscayne Bay will be one of the finest on the Atlantic Coast when completed. The waiting room for the seaplane terminal will contain all facilities for entering and clearing passengers on trips to the Bahamas. To the north of the waiting room will be pilot's chart room and office; on the south will be a shop for emergency repairs and a radio room with copper-covered walls.

The Viking Flying Boat Company will also start operations in Miami with air-rail passenger service between northern cities and Miami. Its hangar, already completed on the Municipal Seaplane Base, was built at a cost of $20,000 and will house eight planes. The Viking boat originated in Europe and is known there as the Shreck. It is used exclusively in the French Navy as a training plane.

COLLEGE AERONAUTIC GROUP JOINS N. A. A.

THE Intercollegiate Aeronautic Association has become affiliated with the National Aeronautic Association, according to a recent announcement of Jesse Loeb, secretary of the Private Flying Club Committee of the National Aeronautic Association. Under the terms of an arrangement which has been effected a special membership category has been drawn up which will permit all undergraduates of recognized colleges to receive special memberships in the National Aeronautic Association. The by-laws of the National association have been changed to encompass the affiliation of the Intercollegiate Aeronautical Association.

Fourteen flying clubs comprise the membership of the Intercollegiate association, of which C. L. Morris is chairman. Mr. Morris is also president of the Yale Aeronautical Society.

A grant of $2,500 has been contributed by Grover C. Loening, to be set aside in the treasury of the contest committee of the Intercollegiate Aeronautic Association. The sum will be distributed as prizes to the colleges which make the best showing in aeronautical engineering, the number of hours flown, greatest number of members in the club, and for amateur records established.

The colleges participating under the guidance of the Intercollegiate Aeronautic Association are: Yale, Harvard, New York University, Michigan, Detroit, Illinois, Purdue, Akron, Toronto, Carnegie Tech, Pennsylvania, Massachusetts Institute of Technology, Case, Northwestern, Kenyon, Ohio Wesleyan, Toledo University, Cincinnati, St. Vincents and Ohio State.

MacCracken Combines Commercial Aviation Activities With Law Practice

WILLIAM P. MacCRACKEN, JR., former Assistant Secretary of Commerce for Aeronautics, has been named chairman of the board of directors of the New York, Rio and Buenos Aires Lines. Mr. MacCracken has also assumed the post of special counsel for the Goodyear-Zeppelin Corporation and Western Air Express. Mr. MacCracken also plans to open a general law practice with offices in New York City and Washington, D. C., but will devote the major part of his attention to the development of air transportation.

The New York, Rio and Buenos Aires Lines plans to extend its air transport operations from South America to New York City by next spring and to establish a seven-day air service between New York and Buenos Aires.

AIRPLANES AID OIL LAND SURVEYS

ADVANTAGES of using airplanes in making geological surveys of prospective oil lands were enumerated in a report issued recently by the Bureau of Mines, U. S. Department of Commerce. It was stated that, in addition to giving a geologist a much clearer indication as to the location of oil than a survey made on the ground, the airplane is a means of saving time and expense.

Aerial photography has an advantage over a ground survey in enabling the geologist to locate readily the faults and details of topography which would escape a surveying party working on the surface of the ground. The airplane has made it possible, according to the Bureau of Mines, to complete a survey of undeveloped country in a few days, the same work requiring months to accomplish on foot.

Aerial photographic maps and surveys first reached an extent of any importance in oil geology in the early part of 1927. Since 1927, more than 5,000 square miles of territory have been mapped from the air for companies producing oil in the western part of the United States alone. Aerial survey service is used by practically all of the major oil companies in California as a regular means of gathering geological information.

When making an aerial photographic survey for geological purposes, a series of overlapping photographs are made from the air at an altitude of approximately 15,000 feet. The chief advantage to geologists of aerial photographs is that when they are viewed through a stereoscope, any portion may be studied as in plastic relief, small details of the country photographed being clearly outlined.

United Aircraft and Transport Announces Earnings

EARNINGS of United Aircraft and Transport Corporation for the third quarter of 1929, ended September 30, amounted to $2,658,331, after all taxes and charges, including preferred dividends, according to a recent announcement by the company. This is at the rate of $1.48 per share on the total number of shares outstanding at the close of the third quarter. Net earnings for 1929 by quarters were as follows: March 30, $1,803,471; June 30, $2,606,034; Sept. 30, $2,838,332.

Weather and Why

[CAP. EINAR E. ELM]

"WEATHER AND WHY," by Capt. Einar E. Elm, formerly of the Air Corps Reserve, is a non-technical text book on the fundamentals of weather, and is intended for ground school and home study. The volume especially emphasizes the elements of weather which are of importance to airplane pilots, and was compiled from notes on the flying experiences of Capt. Elm. The entire work comprises seven chapters which include such phases of the study of weather as fog, climate, weather forecasting, temperature, humidity and precipitation. Particular attention has been devoted to the study of clouds, considered from their importance in the weather computations of airplane pilots.

The Navigation of Aircraft

By LOGAN C. RAMSEY

THE three branches of aircraft navigation—piloting, dead reckoning and aerial astronomy—are covered in "Navigation of Aircraft," a volume recently published by Lieut. Logan C. Ramsey of the United States Navy. The text has been prepared for airplane pilots in general, particularly for students in aviation schools and for candidates for licenses as transport pilots. The volume is divided into seven general categories; an introduction to aircraft navigation; maps, instruments and accessories; dead reckoning; piloting; aerial astronomy; the practice of navigating aircraft, and aerology. The volume encompasses both theory and practice and is intended for practical application in aircraft navigation.

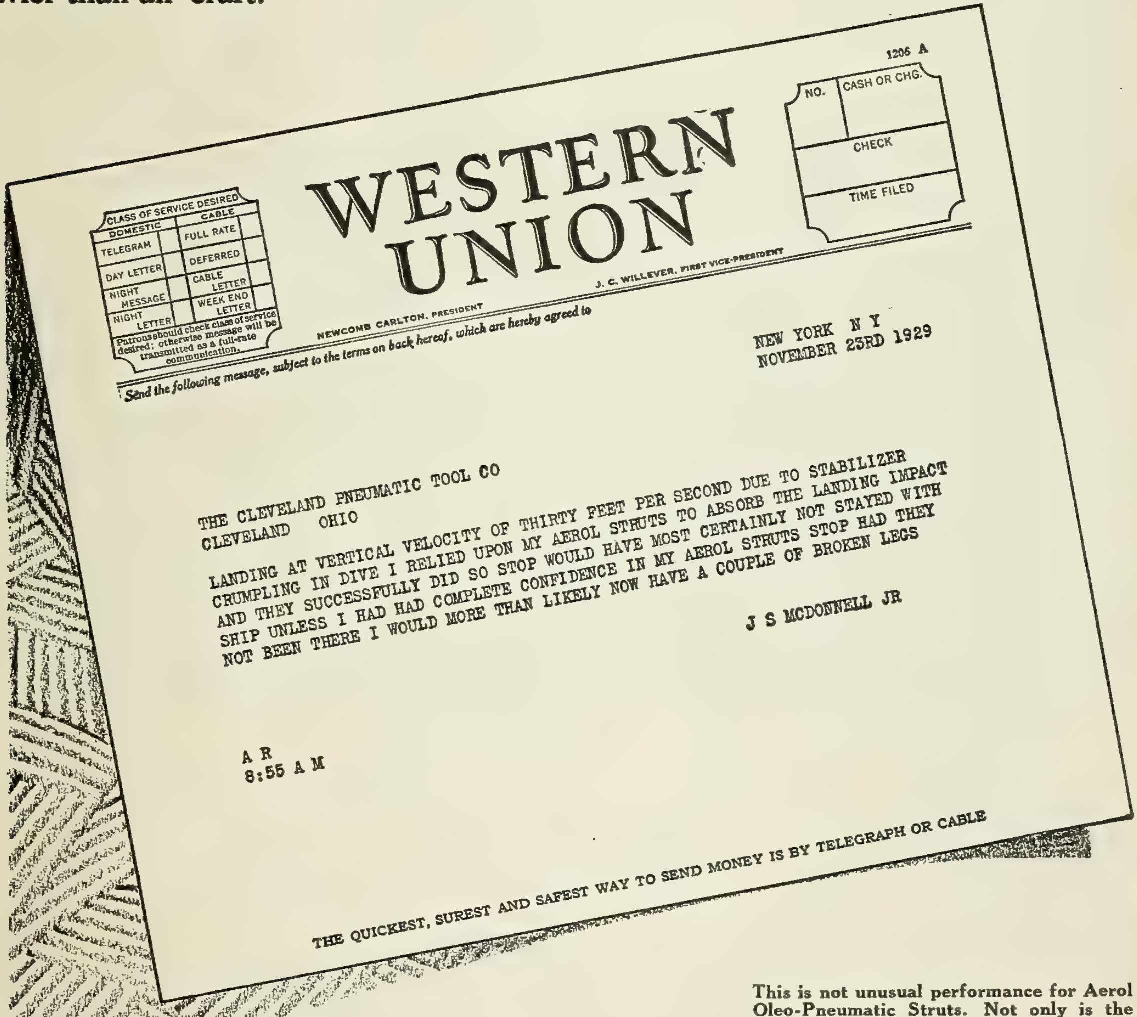
Pilot's Luck

[By CLAYTON KNIGHT]

"PILOTS' Luck" is a collection of drawings made by Clayton Knight which were done originally to illustrate stories by Elliot White Springs, Capt. Roy A. Brown, Floyd Gibbons and Norman S. Hall. The volume is a pictorial record of aerial combat during the World War. Allied and German planes are graphically portrayed, showing the types of aircraft used in the war, combat formations and the individual markings and colorings of the planes engaged.

. . . . . . "I had complete confidence in my Aerol Struts . . ."

Below is a message received from J. S. McDonnell after a mishap to his ship entered in the Guggenheim Competition. It is of interest to every man building or operating heavier-than-air craft.



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Send the following message, subject to the terms on back hereof, which are hereby agreed to

NEW YORK N Y
NOVEMBER 23RD 1929

THE CLEVELAND PNEUMATIC TOOL CO
CLEVELAND OHIO

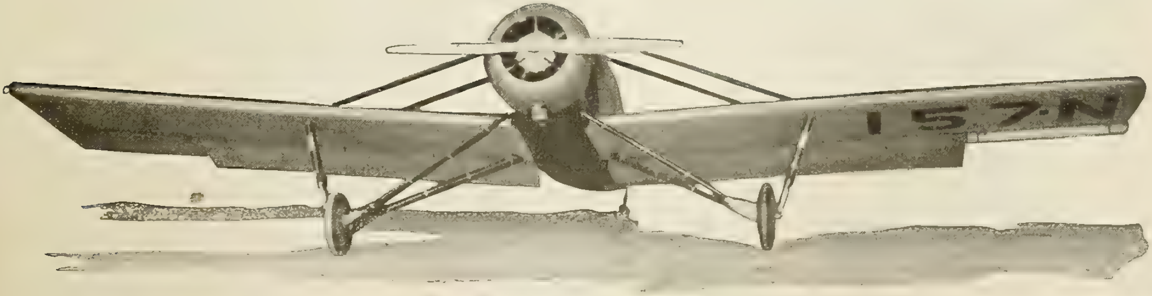
LANDING AT VERTICAL VELOCITY OF THIRTY FEET PER SECOND DUE TO STABILIZER CRUMPLING IN DIVE I RELIED UPON MY AEROL STRUTS TO ABSORB THE LANDING IMPACT AND THEY SUCCESSFULLY DID SO STOP WOULD HAVE MOST CERTAINLY NOT STAYED WITH SHIP UNLESS I HAD HAD COMPLETE CONFIDENCE IN MY AEROL STRUTS STOP HAD THEY NOT BEEN THERE I WOULD MORE THAN LIKELY NOW HAVE A COUPLE OF BROKEN LEGS

J S MCDONNELL JR

A R
8:55 A M

THE QUICKEST, SUREST AND SAFEST WAY TO SEND MONEY IS BY TELEGRAPH OR CABLE

This is not unusual performance for Aerol Oleo-Pneumatic Struts. Not only is the *principle* correct, but the materials, workmanship and safety factor insure efficient functioning of the struts under very extreme conditions. ***That is why more Aerol Struts are in use today than any other make of shock absorber.***



VOUGHT EXPORTS FOR 1929 OVER $1,000,000

ACCORDING to United States Department figures, $7,761,977 worth of airplanes and airplane parts were exported from the United States during the first ten months of 1929. This compares with $3,664,733 for the entire year 1928, and gives an excellent indication of the rapid expansion taking place in American aircraft exports. And yet American made planes are far from dominant in foreign fields, even in neighboring South America.

An example of recent export expansion is offered by the record of shipments to foreign countries made by the Chance Vought Corporation, one of the units of United Aircraft and Transport Corporation. During 1928 less than $200,000 worth of planes were exported by the Vought organization. For the first six months of 1929 foreign shipments of Vought airplanes and parts totaled $575,000, the largest purchasers being Argentina, Cuba, Mexico and Peru. Practically all of this business came without solicitation, and as a result of the reputation made by the Vought production type, the Corsair powered by a Wasp engine.

United Aircraft Exports, Inc., formed by the United group in July of this year, is now handling foreign sales for the Vought company, as well as for the other units of United. During July, August, September and October additional sales of Vought products totaled $475,000, the major portion being for Japan and China, an entirely new field for Vought planes.

It is estimated that an additional $350,000 in sales were negotiated during the last two months of 1929; but without including these, Vought export shipments for the year 1929 would total $1,050,000, which is believed to be a new peace-time record for any single American manufacturer and for any one type of plane, all of these exports being Corsairs and Corsair parts.

This record has been made possible by the reputation of building a quality product and being able to fill orders in emergencies. The Corsair with its Wasp engine, originally developed for the U. S. Navy as an observation-fighting plane for catapulting from warships and deck-landing on aircraft carriers, has, by its high performance and its sturdiness and reliability under the most difficult conditions, become known in all countries. The Vought organization has shown its ability to produce airplanes to meet emergencies in record time. The first of the Corsairs went, on urgent shipment orders, to Nicaragua for the use of the U. S. Marines. When the Mexican revolution broke out last spring, an urgent call was made for Corsairs, and the first three planes were delivered in less than two weeks from the date of the order.

A recent order for Corsairs from the Chinese Nationalists called for prompt delivery so that they could be put into action against the Chinese revolutionists at the earliest possible date.

With the formation of United Aircraft Exports, Inc., and the efforts being made to market Vought planes all over the world, the prospects for additional expansion of Vought exports during 1930 look bright.

Dutch East Indies Purchase Curtiss Military Planes

THE Netherlands Indian Government recently placed an order with the Curtiss Aeroplane Export Corporation for eight Curtiss Conqueror Hawk pursuit single-seater airplanes, spare airplane and engine parts and spare Conqueror engines, according to an announcement made by K. E. Van Dyk, resident manager of Lindeteves-Stokvis, representative of the Curtiss export organization in the Dutch East Indies. Shipment will be rushed as soon as possible by steamer to Java.

Netherlands India possesses a well organized military force, comprising experienced pilots, modern planes of different types, adequate landing fields, well-equipped work shops and a competent technical staff. Aircraft operations in the Dutch East Indies include numerous flights made above every part of the archipelago, often under difficult flying conditions. Aerial maps and surveys have been completed over volcano and swamp areas. Photographs have been obtained of reefs dangerous to water navigation, the clear water permitting record of these under water obstructions.

In addition to their ordinary duties, the military airmen of the service have done mapping, photography, mail and passenger service, crop dusting operations over tea plantations and the observation of volcanic activity.

A military flying school is located at Kalidjatti and an air force depot is maintained at Andir. The naval flying camp is situated at Sourabaya. A private air transportation enterprise was recently formed under the name of the Nederlandsch Indische Luchtvaart Mij, subsidized by the Netherlands India Government. Service has been opened between Batavia, Bandoeng, Samarang and Sourabaya, with eventual extension to include Sumatra and Singapore.

Great Lakes Representative On Tour of South America

L. LUDWIN of the Great Lakes Aircraft Corporation sailed recently for South America, where he will make an aerial tour of the principal South American countries. Mr. Ludwin will be accompanied throughout the tour by F. Salles de Lorena, his assistant, and George Gjoerloff, pilot of the American Aeronautical Corporation of New York City. The tour will be made in an American Savoia-Marchetti S-56 amphibion, and a Great Lakes trainer. Mr. Gjoerloff will fly the Savoia-Marchetti during the trip and Mr. Ludwin and Mr. de Lorena will alternate at the controls of the Great Lakes Trainer.

The tour will be made for the purpose of arranging distributorships for the Savoia-Marchetti line of seaplanes and flying boats and for Great Lakes planes. The Great Lakes Corporation controls the sales franchise for Savoia-Marchetti ships in Latin America. The tour will be made entirely by air from Rio de Janeiro and will be completed in from six to seven months.

Curtiss Engines Ordered for Russia

TEN Curtiss Conqueror engines and spare parts have been ordered for shipment early in 1930 to the Union of Socialist Soviet Republics, through the Amtorg Trading Corporation in New York City, according to John S. Allard, vice president and general manager of the Curtiss Aeroplane Export Corporation. These engines are twelve-cylinder, V-type, liquid-cooled. They are under production in the Buffalo engine plant of the Curtiss Aeroplane and Motor Company. This is one of the first orders of importance for the American airplane engines to be shipped to Russia. Conqueror engines are used by the United States Army in pursuit, attack, observation and bombing planes. They were only recently placed on sale to commercial operators.

Barling Planes to be Distributed in South America

ARRANGEMENTS for the distribution of Barling planes in South America have been completed, according to an announcement by Russell Nicholas, president of the Nicholas-Beazley Airplane Co., Inc., of Marshall, Mo., manufacturers of the plane. Distribution in the southern continent will be handled by George B. Coles, of Buenos Aires. Mr. Coles, who has spent a number of years in South America in the importing and exporting business, will sail from New York shortly after the first of the year with the initial shipment of three planes.

THIRTY-SIX Ryan Broughams valued at $405,000 have been sold for operation in foreign countries. Ryans are operating in China, New Guinea, Australia, Japan, England, Argentina, Guatemala, Mexico, Canada, Italy and Alaska.

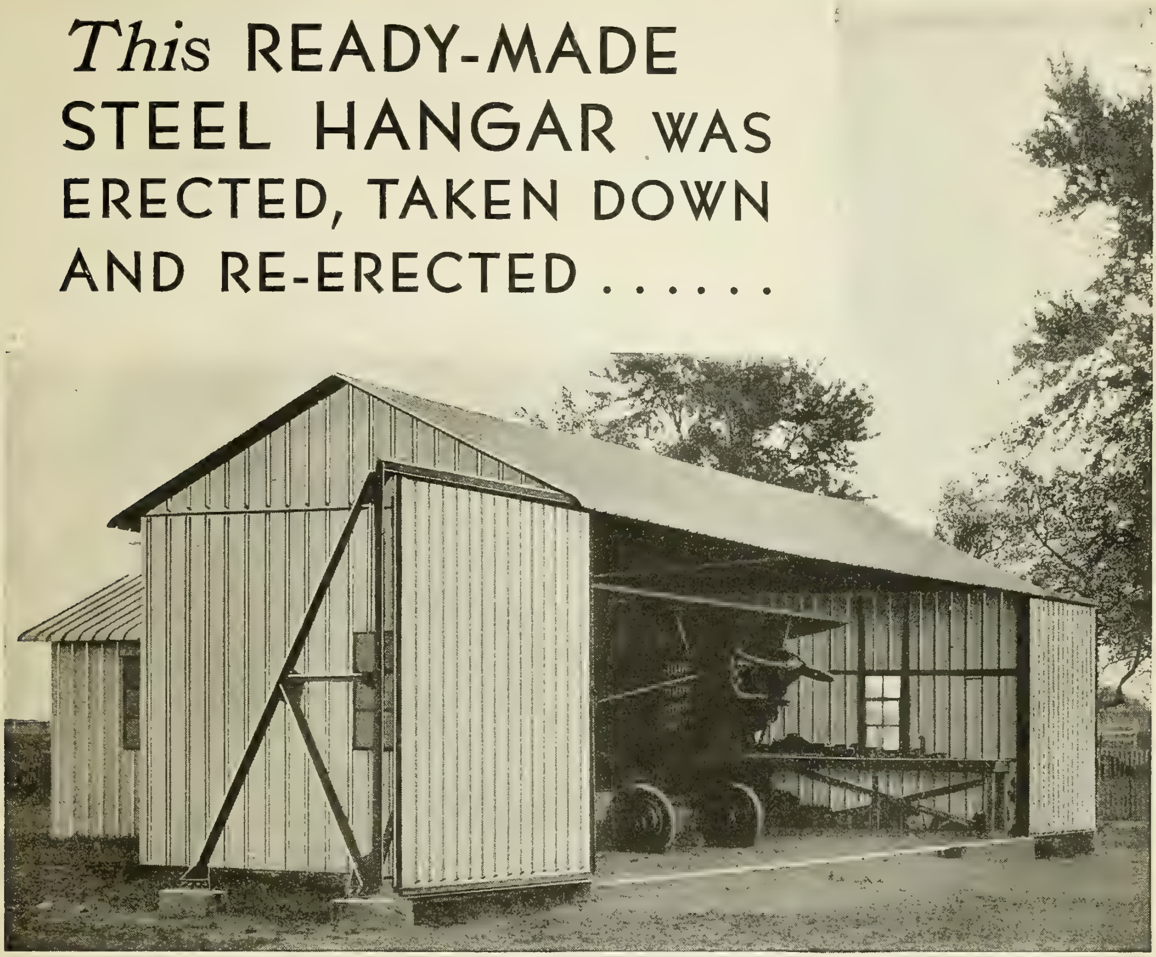
EUROPEAN TOUR OF FORD PLANE

SALE of the first all-metal Ford air transport plane to a European government was announced recently by the Ford Motor Company. The news from Prague that the aircraft had been purchased by Czecho-Slovakia, after a demonstration by LeRoy Manning, chief test pilot of the Ford Motor Company, followed the completion of a tour of twenty-one European countries by a Ford trimotor which began immediately after the International Aircraft Show in London.

Leading aviators, aeronautical engineers and airplane manufacturers in the different countries visited, as well as officials of the various governments, were carried in the American ship during the tour and expressed enthusiasm for its performance. Manning, who piloted the plane over Europe, landed at all important airports on the Continent and visited a large number of airplane fac-

(Continued on next page)

This READY-MADE STEEL HANGAR WAS ERECTED, TAKEN DOWN AND RE-ERECTED . . . . . .



. . . . without the loss of anything more than a few dropped bolts and taps, when the Iowa Air Transport Company, Boone, Iowa, moved it to a new airport location.

In Butler Ready-Made Steel Hangars, every unit is formed to template, and matched punching facilitates bolting accurately in position. Erection, taking down or re-erection is so simple that one man can do it with the smaller sizes.

Butler Individual Ready-Made Hangars are made in sizes suitable for all ships and with either half-round or gable roofs. The Butler 3-in-one Hangar has a garage and a work room built in.

T-shape design, finished appearance, fire-safeness, structural qualities which make for permanence, economy of acquiring and economy of maintenance—all these are Butler Ready-Made Hangar characteristics. Their sum-total is the solution of your airplane sheltering problem.

A new booklet pictures installation of Butler Individual and Commercial Airport Hangars. Butler engineering service will supply full information and prices if you will mention the size building in mind.

BUTLER
READY-MADE
HANGARS

BUTLER MANUFACTURING COMPANY

1234 Eastern Avenue
Kansas City, Missouri

934 Sixth Avenue, S. E.
Minneapolis, Minnesota

STEEL BUTLER PRODUCTS

(*Continued from preceding page*)

tories. Arrangements for the tour were made by J. Parker Van Zandt of the Ford Motor Company, who accompanied the craft throughout the journey.

One of the most interesting phases of the tour was the visit of the all-metal transport to Moscow. The arrival there was made the occasion of a demonstration and a banquet attended by the leading aviation figures of the Soviet nation, including officials of the air ministry. The Ford was the second American-owned plane ever to reach the Russian city, Colyer and Mears having been first on their world tour.

The ship was not late in a single instance in reaching a city scheduled on the tour. Between Aug. 3 and Oct. 6, it made stops in twenty-one countries and flew over several others. It carried more than 4,000 passengers, landed at 46 airports and flew a distance of 15,000 miles. The rapidity with which it covered Europe is indicated by the fact that demonstrations were held in three countries in a single day, and in seven countries in seven days. No engine trouble was experienced on the entire trip.

The plane was sent to Europe for exhibition at the International Aircraft Show at Olympia Gardens, London, by the Ford Motor Company in June. It attracted much attention while displayed there. Similar interest was aroused at other airports.

MISS EARHART SETS NEW SPEED RECORD

A NEW speed record for women of 184.17 miles per hour was recently established by Amelia Earhart at the Metropolitan Airport, Los Angeles, Calif. Miss Earhart flew a standard Lockheed Vega monoplane, equipped with N. A. C. A. cowling and streamlined landing gear. In her flight to establish a new speed record for women, Miss Earhart made four trips over a closed course. Her fastest speed was clocked by representatives of the National Aeronautical Association at 197.8 miles per hour. The former women's speed record was 156 miles per hour.

Civil Service Exams for Aeronautical Engineers

THE United States Civil Service Commission has announced open competitive examination for positions of associate aeronautical engineer and assistant aeronautical engineer, which will be held to fill vacancies in the Bureau of Aeronautics, Navy Department, Washington, D. C. Applications for the examinations must be on file with the Civil Service Commission at Washington, D. C., not later than January 22, 1930.

Competitors will not be required to report for examination but will be rated according to education, training and experience. The duties of the applicants selected will be in connection with original research, investigation, development and design in aeronautical engineering.

Civil Service Exam for Chief Aeronautical Draftsman

THE United States Civil Service Commission recently announced an open competitive examination for chief engineering draftsman for aeronautics. The examination is to fill a vacancy in the Bureau of Aeronautics, Navy Department, Washingnton, D. C., and vacancies occurring in positions requiring similar qualifications throughout the United States. The entrance salary is $2,600 a year. Higher-salaried positions are filled through promotion.

NEW YORK

THE manufacture of pontoons designed to equip a majority of standard modern production airplanes has been inaugurated by the Flying Boat and Pontoon Division of the Fairchild Airplane and Manufacturing Corporation of Farmingdale, L. I. The Fairchild Company will produce pontoons to meet the needs of standard airplanes of from 1,550 pounds gross loading to 11,300 pounds. They will be standard Fairchild types, made of Alclad metal on spruce and ash frame-work with six water-tight compartments. The pontoon production work will be under the direction of F. P. H. Beadle.

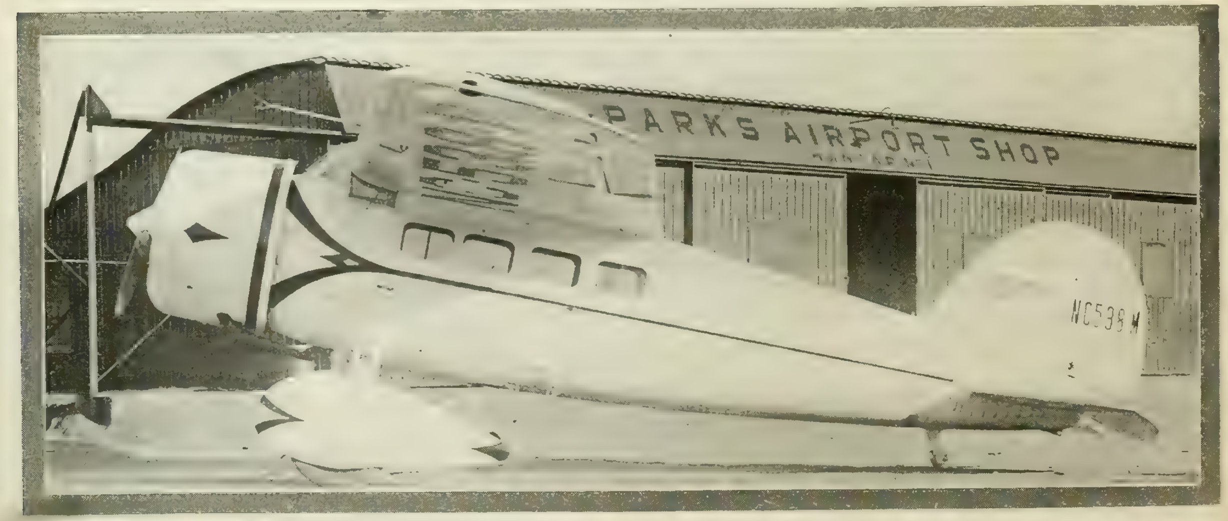
The announcement of the Fairchild Company's entrance into the general field of pontoon manufacture was made with the delivery of a set of pontoons to the Ford Motor Company, Metal Plane Division, for use on a Ford trimotor plane. The set of pontoons was the largest so far made at the Fairchild plant, and was specially designed for a gross loading of 11,300 pounds. Each pontoon is 29 feet long, 41 inches in beam and 38 inches deep. Each has a displacement of 11,000 pounds and a weight of 510 pounds.

THE Sunrise Flying Club recently dedicated its new 100-acre airport at South Ozone Park, L. I. The field of the Sunrise Flying Club has four runways, each more than 1,500 feet in length. An all-metal hangar has been constructed, a wind-sock installed and the field leveled and graded. There is a clubhouse adjacent to the field. The membership totals eighty-five, forty of whom are flying members.

THE Department of Commerce recently approved Model SE4000 Travel Air biplane, powered with a Wright Whirlwind 165 engine and equipped with Edo floats. The Department of Commerce tests were conducted at the Edo seaplane service base at College Point, L. I., under the supervision of Raymond B. Quirk of the Department of Commerce, and George B. Post, who represented the Travel Air Company and the Edo Aircraft Corporation.

Tests were made with the maximum allowable gross load of 2,820 pounds, consisting of 67 gallons of gasoline, 5 gallons of oil and three passengers weighing 170 pounds each, making a total useful load of 960 pounds. The plane took off in calm air in from 19 to 22 seconds. This ship is the fourth type of Travel Air to be approved by the Department of Commerce and is the seventeenth Edo float installation to

(*Continued on next page*)



Lockheed Vega in which Amelia Earhart recently set a new speed record for women of 184.17 miles per hour

They Eventually Come Home to Roost

BY

E. B. GALLAHER

Treasurer, Clover Mfg. Co.

Editor, Clover Business Service

Literally thousands of mechanics and merchants have told our salesmen, and written us the past year to say, that they had been led astray from the straight and narrow path—had fallen for the hurrah which was made a few years ago when water-mixed valve-grinding compounds appeared as cure-alls.

Now these men are wiser, and have come home to roost—they realize that **Clover Grease-Mixed Grinding and Lapping Compound** will not only grind valves ***better*** than anything else, but it is also ***the ideal*** shop abrasive for all kinds of lapping, surfacing, polishing and fitting of parts.

Water-mixed compounds, on the other hand, are single-purpose products for use exclusively in valve-grinding, where speed is the chief requirement; and this speed is obtained through such high concentration of the abrasive that it renders them useless for anything else.

I fell for the big noise also—worked two years to produce Clover WATER-MIXED Compound, which will do anything that any other **water-mixed** compound can do—and I think a little bit more. Don't take my word for this last—I may be biased. Get a sample and prove it.

Anyway, **we make them both** and sell lots of Clover WATER-MIXED to the hi-speed fellows; but from my thirty years of practical shop experience I naturally lean to the old reliable Clover Grease Mixture—the fact that mechanics have bought some 50 million cans of **Clover Grease-Mixed** during the past twenty-five years backs my judgment.

If you are not using **Clover Grease-Mixed Compound,** allow me to send a large sample with my compliments—I know you'll like it—and, if you also want a sample of **Clover Water-Mixed** for a hi-speed valve job, just mention that fact and it will come along in the same package.

Gallaher

CLOVER MFG. CO., NORWALK, CONN., U. S. A.

SINCE 1903

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METAL CUTTING PAPERS AND CLOTH
AUTOMOBILE NICKEL PASTE
METAL POLISHES

CLOVER GRINDING AND LAPPING COMPOUNDS

E. B. GALLAHER:
Clover Mfg. Co., Norwalk, Conn.
Send Samples checked ✓

Clover GREASE-MIXED Grinding and Lapping Compound . . . ☐
Clover WATER-MIXED Hi-Speed Valve-Grinding Compound . . ☐

Name

Address

Character of Business

(*New York News Continued*)

receive the approval of the Department of Commerce.

THE Bendix Aviation Corporation has appointed Air Associates, Inc., distributor in the New York and Chicago territories. Air Associates, Inc., operating at Roosevelt Field, L. I., and at the Chicago Municipal Airport, will maintain a Bendix service station at each of the fields.

Vought Planes Shipped to China

THE Chance Vought Corporation of Long Island City, N. Y., recently shipped three Vought Corsairs to China on an order of the Chinese Nationalist government. The planes were included in an order for twelve planes for which the Nationalist government has contracted from the Chance Vought Corporation. The shipment of the three machines made a total of six Chance Vought planes shipped by the company to China, and included in the order. The total order involves a purchase price of $1,000,000.

The type of Vought Corsair ordered by the Nationalist government is a two-place Navy-type combat plane, equipped for machine gun and bombing work.

ORDERS totaling $15,000 have been received by the Consolidated Aircraft Corporation of Buffalo from the United States Navy Department for spare outboard floats and float struts. Delivery is to be made by the middle of January. The Consolidated *Admiral,* officially designed for the United States Navy for patrol duty and designated as PY-1, will be taken with the Fleet on its winter maneuvers.

THE Gorman Brothers, Aircraft Division, of 2262 59th St., Brooklyn, have recently been appointed dealers of the Barling NB-3 monoplane manufactured by the Nicholas Beazley Airplane Company, Inc., of Marshall, Mo. Demonstrations will be given by the firm at Roosevelt Field, Long Island, and by request at the Barren Island Airport in Brooklyn, N. Y.

Gorman Brothers will handle all models of the all-metal low-wing three-place plane, which is powered with a LeBlond 60, Velie 60 or Genet 80 horsepower engine.

A GATES RSV convertible mono-biplane won the "slow" race for airplanes recently during an air meet at Hanley Airport, Staten Island, N. Y. The plane maintained an average speed of 28.1 miles per hour throughout the race.

LIEUT. HARRY C. KING, formerly of the Army Air Corps, has been appointed sales manager of A. F. Stoeger, Inc., of New York, distributors of domestic and imported arms and ammunition. Lieut. King was formerly an instructor in bombing and aerial machine gunnery in the Air Corps.

TWO amphibion planes have been acquired by the New York City Police Department for the use of the flying police squad which was recently organized with twelve members appointed to the unit. The Police Department purchased a Savoia-Marchetti S-56 from the American Aeronautical Corporation. The ship is a three-place open-cockpit amphibion, equipped with a Kinner engine of 90 horsepower. A Loening Commuter, a five-place amphibion powered with a Wright engine, was purchased from the Keystone-Loening Aircraft Corporation.

The flying police squad has undergone flight training at Curtiss and Roosevelt Fields, Long Island. The squad will use the two planes to patrol the New York metropolitan area to enforce the air traffic regulations of the Aeronautics Branch of the Department of Commerce. The planes will be used to curb low flying over the metropolitan area, to prevent airplanes from flying over congested areas during the rush hours, and for patrolling the water front.

LIEUT. LEIGH WADE, chief test pilot for the Consolidated Aircraft Corporation of Buffalo, N. Y., sailed recently for South America, where he will represent the Consolidated company in supervising the South American sales of Consolidated flying boats. Lieut. Wade is a former member of the Army Air Corps and was one of the Army around-the-world fliers.

E. S. TWINING AND COMPANY recently consolidated with Wellington, Sears and Company of New York City, according to a recent announcement of the officials of the two companies. The combined companies will manufacture and distribute Flightex fabrics, tapes and other airplane products, which will all be made on the looms which formerly turned out products of the Twining company. Wellington, Sears and Company will continue under the consolidation the manufacture and distribution of fabrics for the aircraft and mechanical trades.

The dealer organizations formed by the Twining company before consolidation was effected will continue the distribution of its products. These distributors are: Air Associates, Inc.; Johnson Airplane and Supply Company; Nicholas-Beazley Airplane Company; Pacific Airmotive Corporation; and Southern Aeromotive Service, Inc.

SUMNER SEWALL, formerly general traffic manager of the Colonial Airways Corporation, has been appointed assistant traffic manager of the Aviation Corporation. Ben A. Pollet will succeed Mr. Sewall as general traffic manager of the Colonial Airways Corporation. Mr. Pollet was formerly traffic manager of the Boston division of the Colonial company.

CENTRAL NEW YORK

[MILDRED MARVIN]

AN ordinance providing for the development of an enlarged Municipal Airport at Amboy, near Syracuse, N. Y., is planned for introduction in the common council of Syracuse. The program for the expansion of the flying field involves the acquisition of 139 acres of land across the highway from the present airport, which belongs to the Empire Air Transport Corporation. The plan calls for the abandonment of the present highway which now divides the two areas. The new proposed highway will skirt the edge of the flying field along the line of Nine Mile Creek. The additional land will give the city an aviation field of approximately 269 acres or about twice the size of the present airport. Extensive building development is planned in conjunction with the airport expansion.

MARTIN Schempp, instructor of the Syracuse Glider Club, recently won his wings as first class glider pilot. He obtained recognition as a first class pilot from the Federation Aeronautic Internationale.

ESTABLISHMENT of a ground school course in Ithaca, N. Y., by the Elmira Branch of the Eastern Aeronautical Corporation has been announced by Sherman Voorhees, manager. The course will be given under the auspices of the Cornell University Flying Club.

A PLANE construction class was started recently in Seneca Falls, N. Y., with fifteen members in the class. A plane will be built by the students under the supervision of Raymond Acre. Mr. Acre is both a licensed pilot and airplane and motor mechanic, and has had a wide range of experience as a builder of airplanes and gliders. The plane being constructed by the students will have a monoplane wing and will be powered with a Hall-Scott, A-7A engine. Mr. Acre will also conduct a course on airplane engine construction.

FIVE model airplane clubs are now functioning in Syracuse under the supervision of the Y. M. C. A. model plane club. The members are taught the principles of airplane construction in the model plane building. H. P. Naumann, secretary of the Y. M. C. A., is organizer of the club.

A NEW $20,000 hangar was recently dedicated at the Cortland, N. Y., Municipal Airport. The new hangar is 84 by 100 feet and is constructed of sand blocks and steel. The outside is finished with white stucco. The front part is used for offices, the waiting room being on the west side, and the machine and work shops on the east. The shop part of the building is one-story high, while the rest is the equivalent of two stories. There are sliding doors on the south end, which allow more than one ship to leave the hangar at the same time. The structure has a capacity of 10 ships.

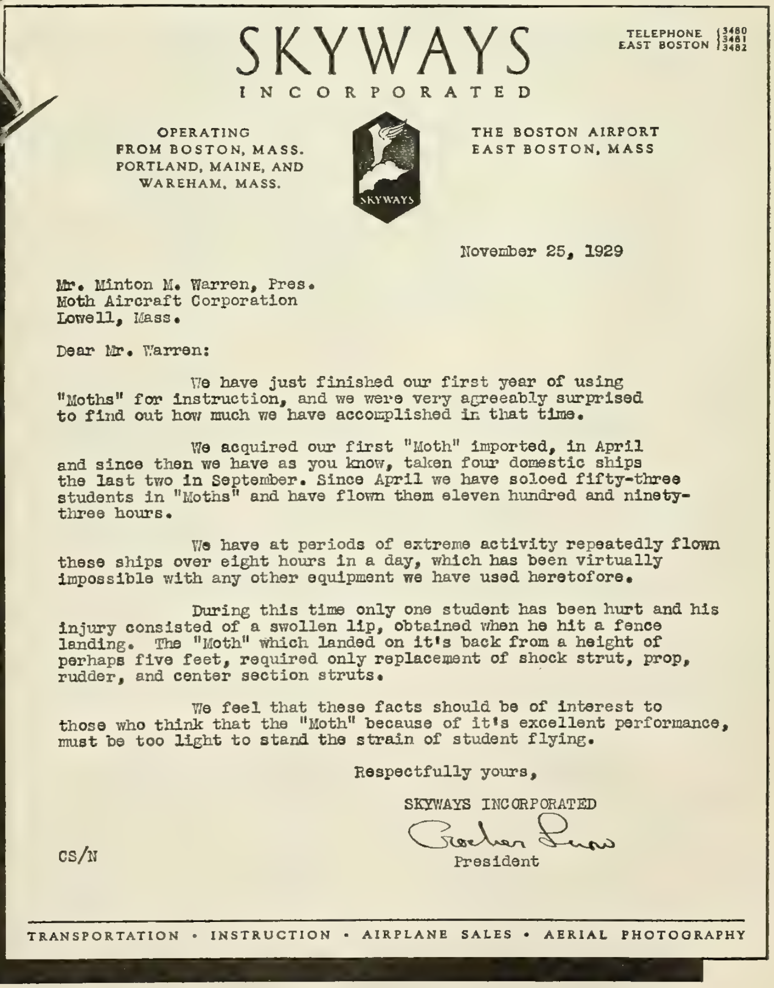
THE Department of Commerce recently rented an acre of ground at the municipal airport at Buffalo, N. Y., for a fee of $1 a year, upon which it will erect an $85,000 radio beacon. Government officials are also planning to erect such a beacon at the Amboy-Syracuse Municipal Airport.

The radio range beacon of the aural type has already reduced interruptions and de-

(*Continued on next page*)

MOTH *makes* Big *Flying School Profits*

THE GIPSY MOTH'S low first cost; its economy of operation; its folding wings which cut hangar rent in half; and its ability to stand up under hard landings, ensure substantial profits to flying schools. Albany Air Service reports $1500 net profit from two months instruction! Let us give you figures showing how *MOTHS will make more money for you.*



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PORTLAND, MAINE, AND
WAREHAM, MASS.

SKYWAYS

THE BOSTON AIRPORT
EAST BOSTON, MASS

November 25, 1929

Mr. Minton M. Warren, Pres.
Moth Aircraft Corporation
Lowell, Mass.

Dear Mr. Warren:

We have just finished our first year of using "Moths" for instruction, and we were very agreeably surprised to find out how much we have accomplished in that time.

We acquired our first "Moth" imported, in April and since then we have as you know, taken four domestic ships the last two in September. Since April we have soloed fifty-three students in "Moths" and have flown them eleven hundred and ninety-three hours.

We have at periods of extreme activity repeatedly flown these ships over eight hours in a day, which has been virtually impossible with any other equipment we have used heretofore.

During this time only one student has been hurt and his injury consisted of a swollen lip, obtained when he hit a fence landing. The "Moth" which landed on it's back from a height of perhaps five feet, required only replacement of shock strut, prop, rudder, and center section struts.

We feel that these facts should be of interest to those who think that the "Moth" because of it's excellent performance, must be too light to stand the strain of student flying.

Respectfully yours,

SKYWAYS INCORPORATED

Crocker Snow

President

CS/N

TRANSPORTATION • INSTRUCTION • AIRPLANE SALES • AERIAL PHOTOGRAPHY

Announcement

As Moth Aircraft Corporation is now a unit of the Curtiss-Wright Corporation, Moth airplanes will henceforth be distributed through the Curtiss-Wright Sales Corporation, 27 West 57th Street, New York City.

U · S · A

LICENSEE: THE DE HAVILLAND AIRCRAFT CO., LTD.

The following schools use Gipsy Moths exclusively for primary instruction:

SKYWAYS, INC.
Boston and West Barnstable, Mass.
ALBANY AIR SERVICE
Albany, N. Y.
HARRIS & BROWN
Wellsville, N. Y.
UTICA FLYING SERVICE
Utica, N. Y.
AIR SERVICE, INC.
Johnstown, Pa.

MOTH AIRCRAFT CORPORATION, *Lowell, Mass.*

DIVISION OF CURTISS-WRIGHT CORPORATION
27 WEST 57TH STREET, NEW YORK CITY

(New York News continued)

lays on the schedules of air mail planes by more than 30 per cent. The system has been extended west as far as Omaha by the installation of beacons at Goshen, Sterling and Des Moines. The Chicago and Boston beacons will soon go on the air.

The beacon planned for Syracuse will be one of the two so far planned for New York State. Construction of the beacon building and the antenna system for the Department of Commerce radio beacon at the Amboy-Syracuse Municipal Airport will start soon, according to an announcement made by H. J. Walls, airways radio engineer of the Department of Commerce. The electrical installation, which will complete the project, is planned to take place during January and February. It is likely that the directive beacon will be in operation early in March.

CAPT. RALPH G. LOCKWOOD, assistant director of operations for the Aviation Corporation, and British flier during the War, has been appointed chief of operations for the Colonial Airways system, which holds the contract for the Cleveland-Albany air mail route passing through Syracuse. He succeeds Dudley E. Rowland.

PAUL E. WILBUR, one of the organizers of the Syracuse Glider Club, was recently elected the club's first president. F. L. Fillingham was elected vice president, and R. L. Gardner, secretary and treasurer. The directors are, besides the three officers, John W. Herrick, Herbert J. Fish and Martin Schempp. Mr. Schempp is gliding instructor for the club.

NEW ENGLAND

[THOMAS F. BRESNAHAN]

WORK of clearing the state-owned airport at Hillsgrove, R. I., continues, and it is expected that by spring the field will be ready for use. Many acres of land have been cleared of trees and brush. According to present plans, the airport commission intends to place a portion of the field in condition at once so that the field may be used. Additional developments will be made continually. Several hangars will be erected just as soon as the runways are ready.

THE Curtiss-Wright Corporation numbers the What Cheer Airport at Pawtucket, R. I., among those which more than supports itself. The field has been greatly improved during the past few months. All runways have been extended to about the 3,500-foot mark.

PLANS for the erection of two hangars at the Newport, R. I., Airport for accommodation of both landplanes and seaplanes are being developed by officers of the operating company. Approximately $70,000 is to be expended by the airport company in its expansion program. There are no hangars on the field at present.

The plans call for the erection of one hangar at the southwest corner of the field, which will accommodate 15 to 20 planes. The cost of this building will be approximately $30,000. A separate hangar for seaplanes will be erected on the shore from at a cost of $40,000.

POSSIBILITY of another airport for Woonsocket, R. I., is seen in the announcement of John Montgomery that he intends to develop the Ballou farm as an air terminus. The Chamber of Commerce announced its intention of establishing an airport some time ago and has a 67-acre tract of land in East Woonsocket under option, which it hopes to develop into a $100,000 airport in the spring.

Mr. Montgomery owns approximately 44 acres and has an option on an adjoining farm which will give him more than 80 acres for development. Some work has already been done in preparing the field for use, and more will be done before spring.

New Sikorsky Plant Nearing Completion

CONSTRUCTION of the new plant of the Sikorsky Aviation Corporation at Bridgeport, Conn., has been completed at a total of $886,000. Construction work on the new plant included the erection of a factory 30 feet by 380 feet which houses manufacturing space and a dope and heat-treating room; an office building 46 feet by 100 feet containing two stories; and a service building 100 feet by 170 feet. All buildings were designed by W. A. Bary, vice president and general manager, and N. O. Smith-Petersen, plant engineer, in coöperation with Fletcher and Thompson, architects of Bridgeport, Conn. The factory and service buildings now complete, and those buildings to be constructed, are of steel and glass structure. The design is such that the buildings are a series of assembly bays. There are three bays 30 feet in height and three 20-foot bays on either side of a large 80-foot central assembly bay.

The Sikorsky Aviation has also begun construction of a wind tunnel and an engineering building. The wind tunnel, which is scheduled to be completed next March, will be of the vertical type, and will be housed in a separate octagon-shaped building 26 feet in diameter and 33 feet in height. The wind tunnel building is to be connected to the engineering building by a passageway. The engineering building, on which construction is proceeding rapidly, is located near the factory and will have a floor area of 48,000 square feet. The building will contain a bay with a 120-foot span, 25-foot clear headroom and a 175-foot length where new models produced by the organization will be assembled; and will house a machine shop, stock room, office, first-aid station, test laboratory, a drafting room and engineering offices. The engineering unit of the Sikorsky plant will be ready for occupancy January 9, 1930, according to officials of the company.

Six acres of property have been purchased adjoining the factory site which will provide a right of way to the Bridgeport Airport where a runway will be constructed which will also connect with a causeway to the water. Construction of this causeway has been practically completed. It is 1,500 feet long and 300 feet wide and extends into the deep water of the Housatonic River. At the foot of the causeway will be a platform 64 feet wide which will provide space for turning planes before or after launching. There is a forty-foot ramp leading down into the water adjacent to two docks which will provide facilities for motorboats. The wharf at the end of the runway will draw eight feet of water at mean low tide and will permit shipment by water to and from the plant.

The service building is located some distance from the factory, the intervening space being left for future additions. The service department has its own machine shop. The service offices contain among the other facilities a lounging room for visitors.

THE Stanley Electrical Tool Company was recently organized by the Stanley Works of New Britain, Conn., to handle the electric tool equipment developed by the Stanley organization, according to an announcement of Stanley officials. The Stanley Electric Tool Company will manufacture and distribute electrically operated tools developed by the Stanley Rule and Level Company, including electric drills, screw drivers, and bench and aerial grinders.

DWIGHT HUNTINGTON has joined the engineering department of the Sikorsky Aviation Corporation of Bridgeport, Conn. Mr. Huntington was formerly project engineer for the Detroit Aircraft Corporation for which he was engaged in the building of the Eastman flying boat.

AT a recent meeting of the board of directors of the Taft-Peirce Manufacturing Company of Woonsocket, Rhode Island, Gordon Gordon was elected president of the organization to succeed the late Louis V. Hubbard. The Taft-Peirce company manufactures precision gages, tool room equipment, magnetic chucks, Mortell reamers and thread milling machines.

JOHN B. LEWIS of Fox Point, Providence, R. I., has been appointed dealer of Argo biplanes for the entire state of Rhode Island by the Alliance Aircraft Corporation of Alliance, Ohio, manufacturer of the plane. The Argo sport and training plane is powered by the Hess-Warrior engine manufactured by the Alliance firm.

[WALTER S. ROGERS]

THE New Bedford-Fairhaven Airport is one of the most promising developments made in New England during the last several months. Sound Airways, Inc., reorganized from the New Bedford-Acushnet Company, is the operator of the new field. Isaac Dorson is president and treasurer of the new company, Dave Sher is general manager and Henry Olden is chief pilot.

The new airport is on the main road east from New Bedford, about three miles from the center of New Bedford and located on the outskirts of Fairhaven. The property

(Continued on next page)

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This book is a practical discussion of the aerial navigation actually used in ordinary, everyday flight. It sets the proper balance between the three branches of avigation—piloting, dead reckoning, and aerial astronomy—something no other book accomplishes. In addition to its major presentation of the principles and practice of position finding by calculation and observation, it covers fully the mechanical aids of navigation; navigational procedure in practice; general advice and equipment; blind flying; application of weather reports and data to navigation; etc.; etc.

Aeronautical Meteorology

***by Willis Ray Gregg,** Senior Meteorologist in Charge of Aerological Division, United States Weather Bureau.* **144 pages, 44 illustrations, $2.50**

Furnishes information needed to understand weather maps at a glance and for applying local observations in forecasting prospective flying conditions. Covers weather forecasting from clouds; average height of clouds of each class; variation in direction and velocity of winds with change of altitude; frequency of winds from each direction at various altitudes; characteristics and dimensions of thunderstorms; general circulation of the atmosphere; visability, instruments and methods of observation; cyclones and anti-cyclones; etc.

Elements of Aviation

***by Colonel V. E. Clark,** formerly Chief Aeronautical Engineer, U. S. Army.* **193 pages, 24 illustrations, $3.00**

Will give you a clear understanding of the fundamental reasons why an airplane flies, why it is stable or unstable, controllable or uncontrollable in various attitudes and conditions—in short, "why an airplane does what it does." Its explanations are simple but absolutely authentic. It will help the beginner learn more rapidly and to become a better and safer pilot. The veteran flyer will find in its pages an explanation of many questions regarding the behavior of a plane that may have bothered him. The flying instructor will find here simple but thorough answers to many of the puzzling questions that his students ask.

Simple Aerodynamics and the Airplane

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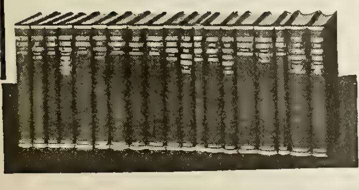
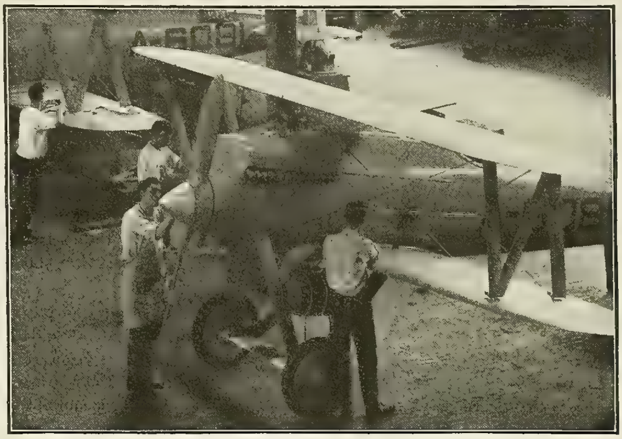
***3rd edition revised by Colonel C. C. Carter,** U. S. Military Academy, West Point.* **418 pages, 211 illustrations, $4.50**

A completely revised and enlarged edition of a famous work which is widely used as an introductory text in ground and flying schools; technical schools, and universities. Among the topics covered are: characteristics and types of airfoils; explanations of lift and drag; parasite resistance; characteristics of aircraft engines; component parts of an airplane; stability; control surfaces; the propeller; airplane performance; dynamic loads; maneuverability and controllability; structural considerations; wind tunnels; methods and instruments for navigation of aircraft; airplane accessories—parachutes, radio, cameras, etc.; etc.





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Rigging, Maintenance, Inspection, Repair

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and E. E. Hall, formerly Lieut., Air Corps, U. S. Army

264 Pages **104 Illustrations** **$3.50**

HERE at last is a practical book covering fully the rigging, maintenance, inspection and repair of airplanes. In writing this manual the authors have made ready for your use their exceptional experience gained in years of service in the Army Air Schools and in outstanding civilian institutions.

This is the book that tells how to get an airplane into flying condition and how to keep it that way. It is especially designed for the airplane mechanic and for everyone who wants to qualify for that rating. It is a manual of daily operating practice for the pilot and the transport and airport service men. As a text for schools training airplane mechanics, it offers the basis for a really practical laboratory and study course.

THE book is written in non-technical language without mathematics, and as far as possible all theory has been omitted. The instructions given are in detail, showing how each operation should be done, in the proper order, and the reasons why. Just as important are the many "don'ts" warning you not to do the wrong thing. In addition to telling all about rigging, the authors have collected and arranged a mass of information about fabric, wood and glue, metal parts, wire, dopes and doping, and folding and packing parachutes. Finally, over 600 questions are listed at the end of the various chapters. These questions are typical of those asked in the Department of Commerce examinations. If you can answer them, and complete answers are given in the text matter, you will know the work of airplane mechanic from start to finish.

A FEW of the many other topics covered are: care and inspection of airplanes; handling of airplanes; maintaining an airplane in good condition; dismantling an airplane; stresses and strains; four methods of rigging; sequence of rigging steps; truing up the fuselage, the center section, the wings, and adjusting the angles of incidence, dihedral, etc.; overall adjustments; spars and struts; splicing and fitting; controls and corrections for instability; practical hints for riggers; inspections; installation and correction of compasses; etc.; etc.

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(New England News Continued)

was formerly a farm and the barn is now being transformed into a hangar and club rooms. There are now 3,000 feet available north and south for main runways and 1,800 feet east and west.

THE Curtiss-Wright organization has moved its shop to the new special shop and service hangar at the Boston Municipal Airport, thus making this organization the only operator to have two hangars at the port. The new hangar is one of the most complete shops in New England for engine and plane overhaul.

Parker McGreevy has been put in charge of the service hangar. The new hangar is completely equipped for service work and for the personnel. An ample locker room and an adjoining shower for the mechanics is supplied. The hangar is large enough to hold ten planes while being worked on. The engine shop is equipped with all the necessary motor stands, lathes and special tool benches to facilitate the work. A stock room carries airplane structural material, engine parts and all other necessary stock. A separate room is fitted for doping and lacquering. Lighting has been arranged so that work may be done throughout twenty-four hour operation. A corner of the hangar is given over to a band saw and machinery for wood repair.

A CONFERENCE of airport executives in the northeastern section of the United States was held at the Bridgeport Airport, Bridgeport, Connecticut, on December 16. Subjects on airport management discussed at the conference included: "Sources of Revenue for Commercial Airports," by David Visel; "Sources of Revenue for the Municipal Airport," by Lieut. N. W. Duffy; "Selling the Airport to the Public," by Colonel N. J. Boots; and "Public Interests and Conveniences at Airports," by Robert A. Warren. A luncheon was served at the Stratfield Hotel in conjunction with the Bridgeport Chamber of Commerce. Following the meeting a visit was made to the plant of the Sikorsky Manufacturing Corporation, which adjoins the Bridgeport Airport.

PENNSYLVANIA

A FLYING course has been added to the curriculum of St. Vincent's College, of Latrobe, Penna., seminary of the Benedictine Order. The college recently purchased its first training plane from the New Standard Aircraft Corporation, of Paterson, N. J.

TWO new companies have been incorporated at Lewistown, Pa., and will be known as the Lewistown Aircraft and Airways, Inc., and the Lewistown Air Transport Company, Inc. The incorporators of both firms were J. O. Yeager, W. J. Yeager, Jr., and J. Ira Cross, of the Yeager Flying Service, which formerly participated in aviation activities at Lewistown. According to the application for charter, Lewistown Aircraft and Airways, Inc., will manufacture, sell, buy, repair and operate airplanes and operate hangars and landing fields. The Lewistown Air Transport Company, Inc., will operate a commercial flying service and will transport passengers, freight, mail and air express.

The companies will operate a flying and ground school and Dr. Raymond Krepps has been appointed as physical examiner at Lewistown by the Department of Commerce. The two companies have taken an option on land in the vicinity of Lewistown and plans call for the development of an airport. Development of the field will require the leveling of the ground and the removing of obstructions. Bids have been sent out for the construction of a hangar 60 by 80 feet.

MAYER AIRCRAFT CORPORATION of Bridgeville, Penna., has been appointed distributor for New Standard training planes in Western Pennsylvania, Eastern Ohio, and the Northern part of West Virginia, according to a recent announcement of George Daws, sales manager of the New Standard Aircraft Corporation.

PHILADELPHIA

[RUSSELL GARD]

THE B. B. T. Corporation of America recently tested out a new floodlight, containing one of the largest incandescent electric bulbs in existence, at Central Airport, Camden, N. J. The container for the light, a standard M-8-D housing five feet in height and four feet in width, weighs 1,100 pounds. The lens is a 1,000 millimeter 180-degree Fresnel type. Shutters are fitted to the housing to protect the lens when not in use, and a sliding blind is mounted in front of the apparatus so that a band of shadow can be cast on the field, enabling a flier to land without being troubled with the glare of the light.

An electric bulb of 20,000 watts, made by the General Electric Company, furnishes the light. The bulb operates on the 110-volt circuit supplying the other illumination of the field. It is about a foot in diameter. A warming current is necessary before the lighting current is turned on. The B. B. T. Corporation in the first tests measured a beam candlepower of 1,200,000. This illuminated an area 3,000 feet square with an intensity of 1.3 candles.

PITCAIRN AVIATION, INC., operator of the air mail line between New York and Miami, recently installed a teletype system over its line, to permit uninterrupted and instantaneous communication between any and all of its fields on the route. The machines were put into operation December 1st.

THE "Imperial," one of the first small sport planes to be built in Philadelphia, was test flown recently at McCusker Field, Pine Valley, N. J. Bill Monaghan piloted the plane on its tests. The plane is powered with a 35-horsepower engine, and is to be manufactured in a factory located at Camden, according to J. E. McCusker, president of the company.

THE American-built autogiros, manufactured in this country by the Pitcairn-Cierva Autogiro Company, are being extensively tested, with Harold F. Pitcairn, president of the company, James G. Ray, and C. J. Faulkner alternately piloting the ships. The tests have shown the advantages of a geared engine. In making vertical landings, the combination of the Goodyear Air Wheels and Aerol struts have proven of value.

DELAWARE

CANADIAN business men recently formed the Bellanca Aircraft of Canada, Limited, to succeed and take over Bellanca Aircraft of Canada, Registered, representative of the Bellanca Aircraft Corporation, New Castle, Del., in the Dominion of Canada. The Canadian organization is financed by Canadian capital, and is not a subsidiary of the Bellanca Aircraft Corporation, but has contracted with the American Company for the exclusive right to distribute and service Bellanca Aircraft in Canada. The following officers of the firm were elected: D. M. Martin, president and general manager; H. S. Day, vice president and treasurer; J. O. Rae, sales manager, and John Ball, secretary. The board of directors includes D. M. Martin, H. S. Day, J. O. Rae, T. H. P. Molson, and F. R. Whittal.

As soon as conditions warrant, the Canadian firm plans to establish a Canadian factory for Bellanca planes under the agreement with the Bellanca Aircraft Corporation so that airplanes can be produced for Canadians free from the annoyance and expense involved in importation.

PRELIMINARY arrangements have been completed by Dr. Adolph K. Rohrbach for the organization of the Metal Flying Boat Corporation of Delaware which will manufacture in this country the Rohrbach-Romar III, an adaptation of the Romar I, manufactured in Germany by the German company headed by Dr. Rohrbach.

Temporary offices of the company have been established in the General Motors Building, New York City. Present plans for the organization of the Metal Flying Boat Corporation include the selection of a site for a factory in January, the organization of personnel and arrangement for a production schedule.

The Rohrbach-Romar III will accommodate forty passengers and will be powered with engines of American manufacture. The company plans to manufacture the Rohrbach-Rolland, a trimotor landplane, in this country as soon as production is under way on the flying boat.

MARYLAND

[E. W. WALSH]

A LARGE modern airport, which will be erected by the Curtiss-Wright Airports Corporation, has been started on a 261-acre tract at Baltimore. The project will require five years for completion, although a sufficient amount of the airport will be developed by next April to permit its operation. Two hangars are nearing completion

(Continued on next page)

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4. Curtiss-Wright issues an inspection certificate with every sale.

Name of Plane	Type	Open or Cabin	No. of Pass.	Plane No.	Type of Engine	Plane and Engine Time	Price	Location
Cessna	Mono.	Cabin	3 & Pilot	8783	Warner	New	$4,750.	Buffalo
“	“	“	“ “ “	8144	“	10	4,700.	Valley Stream
“	“	“	“ “ “	8797	“	New	4,750.	Garden City
“	“	“	“ “ “	8787	“	23	4,650.	San Francisco
“	“	“	“ “ “	NC-9094	“	44	4,550.	Valley Stream
“	“	“	“ “ “	9095	“	94	4,280.	Boston
“	“	“	“ “ “	C-8141	“	14	4,675.	Indianapolis
“	“	“	“ “ “	8150	“	57	4,515.	Louisville
“	“	“	“ “ “	C-9858	“	21	4,650.	Memphis
“	“	“	“ “ “	C-9866	“	6	4,720.	Denver
“	“	“	“ “ “	C-8145	“	17	4,670.	Raleigh
“	“	“	“ “ “	C-9856	“	24	4,630.	Pittsburgh
“	“	“	“ “ “	9851	“	18	4,650.	Houston
“	“	“	“ “ “	C-9859	“	7	4,715.	Cleveland
“	“	“	“ “ “	C-8793	“	New	4,750.	Miami
“	“	“	“ “ “	8784	“	30	4,600.	Los Angeles
“	“	“	“ “ “	C-8795	“	30	4,600.	Chicago
“	“	“	“ “ “		Wright J-6-300	5	9,200.	Baltimore
“	“	“	“ “ “		“ “ 220	9	8,000.	Garden City
“	“	“	“ “ “		“ “ “	5	8,000.	Chicago
Ireland	Amphib.	Open	4 & Pilot	NC-111-H	Wright J-6	Demo.	16,800.	Garden City
“	“	“	“ “ “	NC-88-K	“ “	“	16,800.	Detroit
Ireland	“	“	“ “ “	NC-4667	J5		12,000.	New York City
Curtiss Robin	Mono.	Cabin	2 & Pilot	NC-901-K	Curtiss OX-5	30	3,450.	Buffalo
“ “	“	“	“ “ “	NC-949-K	“ “	50	2,900.	Indianapolis
“ “	“	“	“ “ “	NC-904-K	“ “	42	2,990.	Kansas City
“ “	“	“	“ “ “	106-E	“ “	29	3,045.	Philadelphia
“ “	“	“	“ “ “	C-8398	“ “	34	3,030.	Pittsburgh
“ “	“	“	“ “ “	NC-948-K	“ “		3,200.	San Francisco
“ “	“	“	“ “ “	NC-946-K	“ “	33	3,035.	Toledo
“ “	“	“	“ “ “	108-E	“ “		3,000.	Garden City
Waco	Bi.	Open	2 & Pilot	C-921	OX5		1,800.	Memphis
“	“	“	“ “ “	NC-9513	Ryan Siemans		3,000.	Boston
“	“	“	“ “ “	C-9506	OX5		1,750.	Louisville
Fairchild	Mono.	Cabin	4 & Pilot	NC-3569	J5	206	3,500.	Valley Stream
“	“	“	“ “ “	NC-4755	Challenger	108	3,800.	“ “
“	“	“	“ “ “	NC-32	Challenger		3,900.	Bridgeport
“	“	“	“ “ “	NC-4440	J5		4,000.	Memphis
“	“	“	“ “ “	NC-3315	J5		4,000.	Boston
Travel Air	Bi.	Open	2 & Pilot	NC-6015	OX5	100	1,700.	“
“ “	“	“	“ “ “	NC-6076	OXX6		2,000.	“
“ “	“	“	“ “ “	NC-6012	OXX6		2,000.	Hartford
“ “	“	“	“ “ “	NC-4851	OX5		1,750.	Moline
“ “	“	“	“ “ “	NC-5392	OX5		1,600.	Bridgeport
“ “	“	“	“ “ “	C-8867	Hisso		2,600.	Louisville
“ “	“	“	“ “ “	C-6149	“		2,500.	Baltimore
“ “	Mono.	Cabin	6 & Pilot	NC-6470	J5		7,800.	Moline
Monocoupe	“	“	1 & Pilot	5725	Velie M5		1,400.	Louisville
American Eagle	Bi.	Open	2 & Pilot	C-271-E	OXX6	90	1,650.	Oklahoma City
“ “	“	“	“ “ “	C-545-E	Kinner	36	3,200.	“ “
“ “	“	“	“ “ “	C-5992	Hisso	146	2,200.	Chicago
“ “	“	“	“ “ “	C-7762	OX5		1,500.	Houston
Stinson	Bi.	Cabin	3 & Pilot	NC-2779	Less engine		1,500.	Boston
Sparton	“	Open	2 & Pilot	NC-6577	Siemans Halske		1,750.	Detroit

CURTISS-WRIGHT FLYING SERVICE

DIVISION OF CURTISS-WRIGHT CORPORATION

“World’s Oldest Flying Organization”

(*Maryland News continued*)

on the field and work on several other buildings is ready to start.

The plans of the Curtiss-Wright Airports Corporation for the Baltimore field at the end of the five-year period call for six modern airplane hangars, a large terminal building where lounging quarters, smoking rooms, radios, ballroom, library and waiting rooms for the passengers and accommodations for the pilots will be housed; a student headquarters building, repair shop, headquarters for a students' flying club, a recreation house, picnic grounds, parking space for 2,000 automobiles, motor test house, three garages, and four runways of approximately 3,000 feet.

The hangars at the Baltimore Curtiss-Wright airport will be fireproof, of steel and reinforced concrete, and will be 123 feet wide, 137 feet long, and 35 feet high. The doors will be 100 feet wide. William Whitehurst is the local representative and business manager of the Curtiss-Wright Airports Corporation.

THE Baltimore Airways, Inc., which on October 27th inaugurated an air service between Baltimore and New York, will extend that service southward, according to Edward Handler, of Baltimore, president of the corporation. Plans for the New York-Miami service call for a weekly schedule of three flights each way. In addition to the stop in Baltimore, the planes would land at Richmond, Va., Raleigh, N. C., Camden, S. C., Savannah, Ga., Jacksonville and Miami, Fla. Six-place cabin monoplanes will be used on the proposed route, similar to those now being used on the New York to Baltimore service.

The consistent growth in the business of the concern since its inauguration of the New York-Baltimore service, has also prompted the concern to formulate plans for the placing of additional planes in the service on this route. The Baltimore Airways, Inc., now conducts a daily passenger service between Baltimore and New York. It operates Handler's Field, at Baltimore, named after Mr. Handler, the head of the firm.

A NEW aviation organization, known as the "Pilots and Mechanics Flying Club" was formed recently in Baltimore, Md., at Logan Field. The membership is confined to pilots and mechanics at the field and only to those who are in active service. The object of the club is to provide a plane or planes for the personal use of the pilots which will give the mechanics an opportunity to learn to fly without the cost of attending a flying school. The club's planes and headquarters will be maintained at the field, where the regular meetings of the membership will be held. Lieut. L. H. Dice, field manager for the Curtiss-Wright Flying Service in Baltimore, was instrumental in the formation of this organization.

THE East Coast Airways, Inc., plans to establish its permanent Baltimore terminus on the Baltimore Municipal Airport, at Dundalk, when that airport is completed, according to H. James J. O'Meara, vice president of the East Coast Airways, Inc. Mr. O'Meara said that it was planned to operate fourteen planes in the passenger service along the eastern seaboard. The concern will also maintain a freight service.

THE Women's Flying Club of Maryland was organized recently as the first women's flying organization in Maryland. The membership is not limited to fliers only, but is open to all who are interested in aviation. Miss Sophie Spiekler is president of the group, Miss Alice Benson is vice president, Miss Mildred Batzer, secretary, and Miss Mary W. K. Miller, Jr., treasurer. Gerald E. Woods, in charge of the Curtiss-Wright Flying School in Baltimore, is the advisor of the organization.

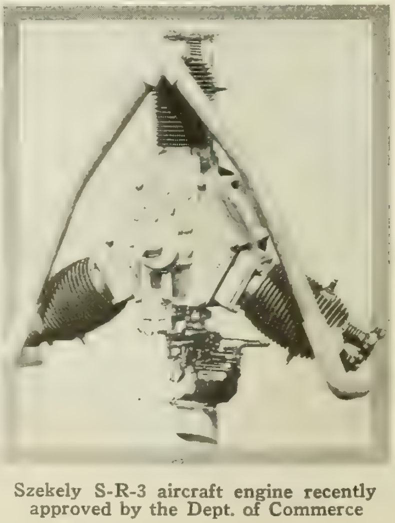
THE proper recognition and development of gliding as a factor of unusual worth as a means of popularizing the airplane was discussed by Captain Frank M. Hawks in speaking at the First Annual Baltimore Aircraft Show, held at the Fifth Regiment Armory, Baltimore, Md., from December 9 to 14.

Many who are at present kept out of aviation by the costs of private flying would find gliding within their means, and gliding would thus develop both trained fliers and a potential popular market which the industry needs, Captain Hawks said.

Eventually the student would start powered flying with the rudiments of flight firmly fixed in mind. Captain Hawks pointed out that the aviation industry is beginning to realize that gliding is a companion, not a competitor, of motored aviation, and that the leaders in the industry are beginning to back gliding schools and glider production.

WASHINGTON, D. C.

THE Department of Commerce has issued an Approved Type Certificate for the Szekely S-R-3 three-cylinder air-cooled radial aircraft engine, manufactured by the Szekely Aircraft and Engine Company of Holland, Michigan. The Szekely company will manufacture the Flying Dutchman, for which an Approved Type Certificate was issued earlier in the year, powered with the S-R-3 engine. The Flying Dutchman is a single-place low-wing training plane.



Szekely S-R-3 aircraft engine recently approved by the Dept. of Commerce

THE Embassy Flying Club of Washington, D. C., was organized recently at an aviation tea held in the Ambassador Hotel, Washington, D. C. Membership in the organization is limited to members and attachés of the various foreign embassies in Washington.

FOUR Whirlwind New Standard cabin planes operated by the Potomac Flying Service, Inc., at Hoover Field, Washington, D. C., carried a total of 20,832 passengers during the summer of 1929 on sightseeing flights over the capital, according to a recent statement made by J. S. Wynne, general manager of the service. One New Standard carried 8,632 passengers from May 1st to November 15th. The others carried 5,109, 5,492, and 1,599 passengers. The last plane was not put into service until the middle of June. The New Standards, including the one used only a part of the season, averaged 5,208 passengers each.

BIDS on what will be the largest wind tunnel and seaplane channel in the world, according to present plans, have been asked by the National Advisory Committee for Aeronautics. The tunnel and channel will be constructed under the supervision of the Committee at the Langley Memorial Aeronautical Laboratory, Langley Field, Va., and will be used for testing aircraft.

The tunnel will be constructed sufficiently large to accommodate a full-sized airplane and will augment three wind tunnels already constructed and now in use at Langley Field. The tunnels now in use accommodate models of airplanes rather than full-sized craft. Airplanes to be tested will be balanced in the new tunnel and the wind forces turned upon them to simulate as nearly as possible actual flight conditions.

The seaplane channel will be approximately 2,000 feet long and 24 feet wide, and will make it possible to test accurately the factors of force, take-off and landing properties of large seaplanes. A sum of $900,000 has been appropriated for the construction of the wind tunnel, and $208,000 for the construction of the seaplane channel.

VIRGINIA

[C. N. SNEAD]

First Virginia Air Tour

THE first official air tour of Virginia was concluded Sunday, November 24th, by Governor Harry Flood Byrd and a party of seventeen prominent Virginians, most of whom were representatives of the state government. Thirteen planes, including two Ford trimotors, left Byrd Airport, Richmond, on November 21 to visit the principal airports throughout the state to encourage Virginia's plan of airport building sponsored by Governor Byrd. The planes visited

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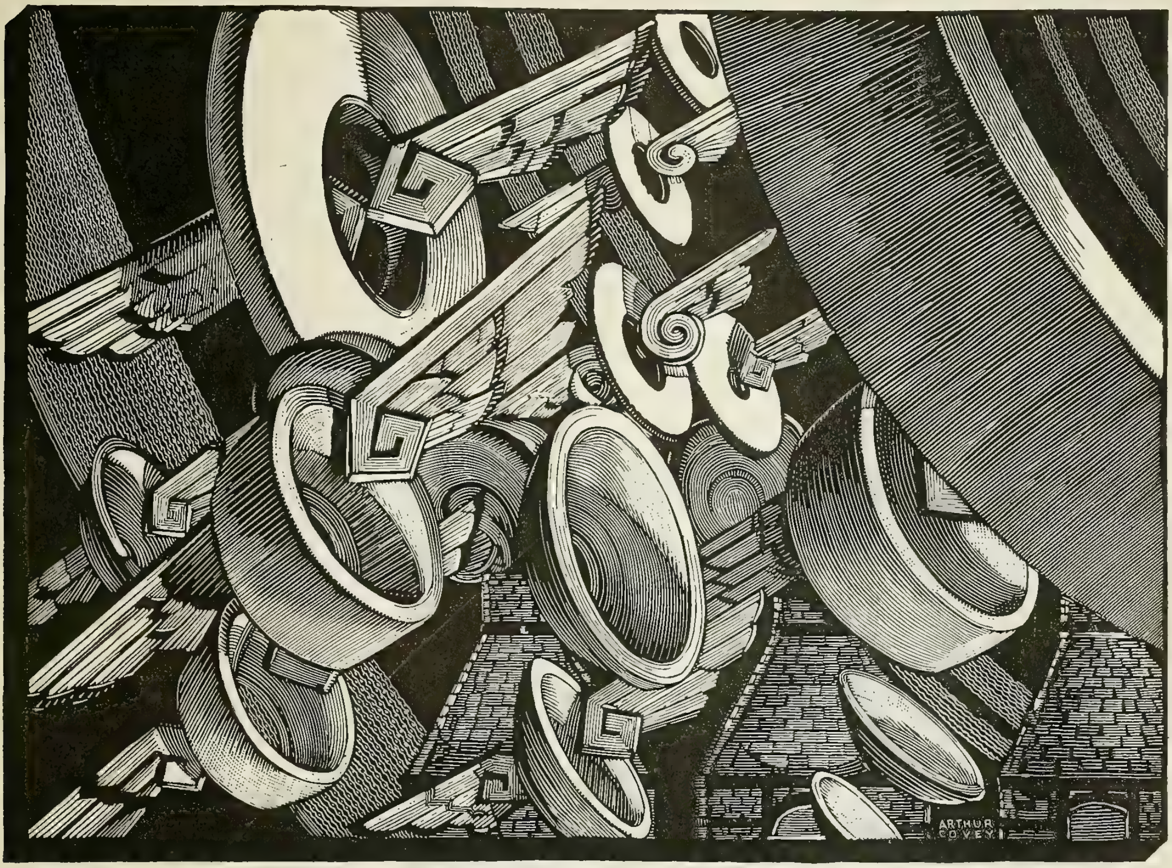

Forth from the kiln—
Wheels! Grinding Wheels!
On wings of speed—
Wheels! Grinding Wheels!
Out over land and sea—
Wheels! Grinding Wheels!
Summoned by all who fashion
products of perfection.

NORTON COMPANY, WORCESTER, MASS.

NORTON

Grinding Wheels
Grinding Machines

Refractories—Floor
and Stair Tiles

(*Virginia News Continued*)

Port Richmond, Emporia, South Boston, Danville, Martinsville and Roanoke.

One of the Fords represented the Navy Department and the other was loaned by the manufacturer. The Marine Corps was represented by a Vought Corsair piloted by Lieut. G. W. Towner, and the Army by two Douglas planes piloted by Lieuts. J. A. Willis and L. M. Merrick. Other planes in the tour included an Eaglerock, entered by Massie and Wood of Richmond, and piloted by Kenneth C. Wood; a Travel Air, entered by Richmond Supply Co., piloted by R. H. Burton; a Transcontinental Air Transport Stearman, piloted by Captain John A. Collins; a Moth, entered by Dixie Flying Service, Charlottesville, piloted by Captain Malcolm Robinson; an Eaglerock of Charles Flying Service, Richmond, piloted by Shelley Charles; a Curtiss Robin of the Lynchburg Flying Service, piloted by E. H. Brockenbrough; a Curtiss Robin of the Standard Oil Co., piloted by R. C. Oertel, and an Eaglerock of the Edgeworth Tobacco Co., piloted by Charles Larus III. The Navy Ford was piloted by Lieut. L. A. Storr and S. C. Ring; and W. L. Bryant and Herbert Green manned the Ford from Detroit.

Huge crowds witnessed the take-offs and landings of the tour at the various airports visited. Governor Byrd stated that the purpose of the tour was to create a wider interest in aviation in Virginia, and to impress upon the public's mind the Virginia plan of building airports. The plan was incorported in the State's law by the legislature of 1928 when provision was made to supply each municipality $1,000 toward building an airport, the municipality to supply the remainder of the cost. The airports must be operated under rules and regulations of the Department of Commerce. The legislature provided a sum of $25,000 for the program, but Governor Byrd announced after the tour's close that he would request that this sum be doubled at the next session of the body.

The Governor's plan is to have built eventually in Virginia sufficient airports to guarantee the safe landing of any plane which might be disabled at normal flying altitude.

THE Pitcairn Aviation Company has appealed to Richmond City Council to be relieved from the operation of Byrd Airport and the servicing of local planes because it interferes with the proper operation of the company's air mail service, and with its plans for the future development of an air transport service connecting New York, Richmond and Florida with South American and West Indian air transport lines. The Pitcairn organization agrees to continue operation of the night light service which is necessary to the mail fliers.

SOUTHERN RUNWAYS

[C. W. McLeod]

DANIEL FIELD, Augusta, Ga., ushered in the flying season on Thanksgiving Day with a formation flight over Augusta by six commercial ships. Pilots Tom Dorset, Skip Tiber, Fred Stone and several others contributed to a program of stunting balloon busting, dog fighting and a parachute jump.

Everything went off splendidly and the only setback to the program came when Pilot Hymes' Hisso Eaglerock smashed its prop on a boundary light. If you know of a spare Hisso prop, ship it to Hymes. With the big hotels just opening, aviation activity at Daniel Field should be going full swing by January. Drop in on your way south, air travelers, and watch a chucker or so of polo.

CAMDEN, South Carolina, which is a bustling cotton town in summer and a summering place in winter, recently opened its airport. Donald Woodward donated this fine field with its hangar facilities to the Camden city and county authorities. Manager Haldeman of the Donald Woodward Airport at Leroy, N. Y., was on hand to look after things. He announced that his staff of instructors from Leroy and most of the flying equipment would winter at the Camden field and that the D. W. Flying Service school would be conducted there. So the South is going to know more about flying by next March.

About 5,000 were on the field to see the events scheduled for the airport's opening day. Five Douglas planes were on hand from Fort Bragg, led by the *Question Mark*. One Martin bomber came in from Langley Field, and three Navy Hawks arrived from Pensacola.

THE Goldsboro, N. C., Municipal Airport has handled plenty of big ships. On the dedication recently it handled several Keystones from Langley, a couple of Sikorskys, a trio of Hawks and five planes from Fort Bragg. In spite of the fact that telegraph poles bound one side and trees another, there is a good opening between the wires and the trees and it's into the prevailing wind.

No commercial operator is on duty at Goldsboro, but the boys drop in occasionally from Rocky Mount, Chapelhill and Raleigh. I noticed that almost every small boy in Goldsboro could direct me to the airport, so aviation is assured a foothold in this town that has the widest main street in the United States.

RALEIGH, N. C., has really enjoyed aviation activity this year. It has been fortunate in being selected by the Curtiss-Wright Flying Service as a base. Since the orange-painted ships have been in service the runways have been graded, a new hangar has been erected and offices and service equipment have been installed.

The downtown office and salesroom of Curtiss-Wright in the Sir Walter building is the center of flying activity, and the door is always open to visiting fliers. Vice president E. H. Thredgill has been carrying on a state-wide program for airports and better landing fields, and Governor Gardner is one of the keenest enthusiasts. Ground courses are proving very popular at State College in Raleigh.

DURHAM, college town, has several fields, but no real port. Just outside this thriving town, across the railroad tracks and in the vicinity of several high water tanks and a few telephone lines there is a field operated by W. A. Williams. No definite flying program is underway in Durham, but Williams is encouraging air-mindedness and visiting planes do their part. If you happen to be cruising about Durham, fly southeast toward two aluminum-painted water tanks and on the west side of the Southern Railway you'll see the field. Good approach from the east with a gradual rise to the western end.

CHAPELHILL, the seat of the University of North Carolina, is football conscious and its flying field does not get the attention from the young gentlemen of the South that some of the northern college-town fields do. However, it does offer a landing field for out-of-town visitors. Chapelhill field can accommodate ships of any size and the chapter houses seem to have unlimited room. A book salesman from Chicago landed there in a Waco 10, recently, and took orders from the college boys for $3,800 worth of books. He filled the orders, too, because every chapter house in Chapelhill has at least four sets.

GREENSBORO'S airport, formerly the Tri-City Airport now operated by Pitcairn, was about the driest field in North Carolina recently, after two days of steady rain. Manager Rafus was definite in his statement that it was operative day and night, and, judging from the floodlights available and the battery of boundary lights, night flying is no problem.

A new cut-stone area has been completed between the main highway and the hangar at the field.

SINCE Miller Airport, Winston-Salem, N. C., was host to the Ford tour, Winston-Salem has been keenly interested in all things that fly. Even Gus Deaton, the flying promotor from Statesville (about thirty miles away), felt the wash of the whirling props and has started to get Statesville's meadow in shape for flying. He promised to take care of trimotors by January first.

Two good-sized hangars house the equipment of Reynolds Flying Service at Miller Airport. Manager Leigh is keenly interested in showing visitors the servicing equipment of the field and Service Manager Lucas has been taking students through the process of rebuilding a Waco 10. One unusual and pleasing thing about Miller Field is the road from the state highway. Remembering the rutted and pot-holed roads leading to some of the nation's leading airports, it was a pleasure to approach Winston-Salem's airport as smoothly as traveling over the famous highways.

IF FLIERS passing over Pinehurst, N. C., would look over toward Southern Pines, about four miles east of the water tanks that top the Carolina Hotel, they

(*Continued on next page*)

(*Southern Runways continued*)

would see the finest set of Bermuda grass runways in the United States. One runs north and south for about 3,000 feet, and the east and west strip is 2,000 feet in length.

Lloyd Yost, of the early Ford Reliability Tours, is in charge of Knollwood Airport, and is also distributor for Wacos in these parts. His Fairchild 71 and several Wacos were recently groomed for the season, which, from hotel bookings, would indicate plenty of activity. The airport is owned by Pinehurst, Inc., and operated by Manager Yost.

FLORIDA

[Johnson Wright]

THE rapid growth of interest in aviation in Florida during the past two years has resulted in an increase in facilities throughout the state. There are now 41 airports within the state that have been officially approved by the Department of Commerce. This places the state fifth in the United States in the number of approved fields. It is exceeded only by California, Texas, Pennsylvania and New York.

THE municipal airport at Tallahassee was officially dedicated recently as the "Dale Mabry Airport." Governor Doyle Carlton took a prominent part in the ceremonies. Visiting planes attending the dedication included six Army Keystone and Curtiss bombers that were on a test flight from Washington to Miami and return under command of Major Knerr, and private and commercial planes from airports in Florida, Georgia and Alabama.

THE Pan-American Airways and its afliated company, Pan-American Grace Airways, have extended their services during 1929 from operation of a line 260 miles in length between the United States and Cuba to a system serving 26 countries over 13,000 miles of airways. Among the countries now being served are Argentina, Chile, Peru, Ecuador, Colombia, Panama, Canal Zone, Costa Rica, Nicaragua, Honduras, British Honduras, Cuba, Salvador, Guatemala, Mexico, Haiti, Dominican Republic, Porto Rico, Trinidad, British and Dutch Guiana, Dutch West Indies, the Bahamas and the Windward and Leeward Islands.

THE Viking Flying Boat Company, Inc., began operation of its seaplane base at Miami on December 1st. This company possesses the only hangar for seaplanes in Miami. The equipment in operation includes four Viking flying boats and two Kitty Hawk biplanes on pontoons. L. H. Fales is vice president and general manager of the company and Jack Tweed is operations manager.

The Vikings now in service are four-passenger seaplanes powered with Hispano engines. They are of French manufacture, although manufacture of these seaplanes in the United States is now under way by the Viking company. It is planned to power the domestic planes with Wright J6 engines.

[J. M. Murray]

NIGHT air mail service between Miami, Fla., and Atlanta, Ga., via Jacksonville, may be begun early in 1930, it was indicated in an announcement made recently by A. P. Kerr, superintendent of operations south of Atlanta for Pitcairn Aviation, Inc. Contracts for the necessary beacon lights between Jacksonville and Miami have been let and the lights are being installed. No night service for the Jacksonville-Tampa route is planned. The beacon lights on the Jacksonville-Atlanta run have been in operation for about two months.

A GROUND school lecture course in aviation was inaugurated at the University of Florida recently by instructors from the McMullen Flying School of Tampa as a result of negotiations conducted with Prof. J. R. Benton, dean of the college of engineering at the University. Engineering students electing to take the work will be awarded credits for a three-hour-a-week lecture course for the semester.

REPLACEMENT of thirteen airplanes destroyed on December 12 when a hangar caught fire at the Municipal Airport, Tampa, Fla., has been practically completed. The cause of the fire is unknown. Flames completely destroyed a hangar at the field with a total estimated loss of $100,000.

Airways Transport, Inc., and McMullen Flying School, whose planes were destroyed by the fire, immediately began replacement of their air fleet and other equipment and wired the Department of Commerce officials to examine their new ships as soon as possible and to issue licenses. Within three days after the destruction of the hangar, there were six training planes and two ships for air mail service in operation at the airport.

ANNOUNCEMENT was made recently of plans for the inauguration next spring of two air transport passenger lines through Georgia to Miami, Fla. Col. Paul Henderson, vice president of the Transcontinental Air Transport, stated that one line would extend from Washington along the Atlantic Coast to Jacksonville and Miami, and that the other would have Atlanta, Jacksonville and Miami as major points.

ALABAMA

[Ora G. Jones]

AIRPORT construction is on the boom in Alabama. More than sixteen airports, the majority of them municipal fields, have been constructed recently throughout the state, and many more are being planned. This progress in building airports has been aided by two things.

The first is the work of the Birmingham Junior Chamber of Commerce which is pushing an aviation educational program in Alabama. This civic organization is offering free engineering service to towns and cities within the state which are planning on the building of municipal airports. The Junior Chamber also sponsored the first Alabama Air Tour, the principal purpose of which was to interest the towns in building airports and to lend assistance wherever possible.

The second factor which has spurred the rapid progress in aeronautics was the Alabama flood during the spring of 1929. For a week or more southern Alabama was under water, and aviation proved its worth to the various towns. Planes flew over the entire flooded area carrying food and medicine to the flood victims.

Brewton, a little town that was hit hard by the flood, has already dedicated its municipal airport. Sheffield, Tuscumbia, and Florence, located at Muscle Shoals, are planning to construct municipal airports in the near future. Huntsville is also looking forward to airport construction. Department of Commerce officials have visited these four towns and surveyed sites.

The airport at Monroeville was recently dedicated with planes from Maxwell Field, Montgomery, and Pensacola, Fla., attending.

Considering these facts, 1930 looks like a good year for aviation in Alabama. With airports everywhere, planes will follow.

THE Montgomery School of Aeronautics at Montgomery, a subsidiary of the Southern Air Express, has announced plans for the inauguration of passenger service from Mobile to Pensacola. Two round trips will be made daily, one trip in the morning and one in the afternoon. The Montgomery School of Aeronautics is now operating passenger service between Montgomery and Jackson, Miss., and between Atlanta and Montgomery.

TENNESSEE

[Virginia Matthews]

INVESTIGATION of a plan for a new municipal airport for Nashville, Tenn., has been started under the direction of state and city officials, assisted by civic leaders. Selection of a new municipal airport will not mean the abandonment of McConnell Field, present municipal field, as that port is to be used as an auxiliary field.

Nine sites have already been surveyed, and several more are under consideration. Ford Bacon & Davis, New York City airport specialists, have recommended a site containing 346 acres and located approximately six and one-half miles from the city. Only fields meeting Department of Commerce A-1-A requirements are being considered.

F. F. FRAKES, sales representative of the Interstate Airlines, Inc., operators of the line from Chicago to Atlanta by way of Nashville, recently established headquarters in the Hermitage Hotel, Nashville. J. M. Wulpi, general traffic manager, has been transferred to Evansville, Ind.

Effective Jan. 1, 1930, air mail planes arriving at Nashville will land at Tennessee Sky Harbor, landing field of the Interstate Airlines, Inc., instead of McConnell Field, the municipal airport.

KENTUCKY

[A. W. WILLIAMS]

THE Louisville and Jefferson County Air Board, operating Bowman Field, the municipal field at Louisville, in its annual report to Mayor Harrison, urged immediate purchase of 150 acres of adjoining property for enlargement of the field. The Board has also recommended either purchase or lease of a suitable practice field, indicating that in its opinion there should be a practice field for student fliers, where there would not be taxi, commercial, and Army ships in the air.

Other suggestions call for completion of the night lighting system, an increase in the paved area for car parking, rolling of the landing area, and removal of the old Army garages from the north to the south side of the field to give more room for take off against the prevailing wind.

The report showed that 1,800 visiting planes landed at the field during the past year, and that 11,500 flights were made. Improvements made during the period included construction of an administration building costing $30,034, making of real estate maps, $455, and other outlays which made total of $53,835.31. In addition, the county at its own expense intalled roadways to take visiting automobiles out of the mud in wet weather.

OHIO

[T. E. LUNSFORD]

FIVE glider clubs of Cuyahoga County have been merged and will be known in the future as the Cleveland Glider Association. The organizations included in the group are the Sail-Plane Aviation Club, the United States Aeronautical Society, the Case Aero Club, the Buckeye Glider Club and the Cleveland Glider Club. The new organization has become affiliated with the National Glider Association. Member clubs will retain their individuality, but will cooperate through the association to promote gliding in Cuyahoga County and northern Ohio through the media of glider meets, new clubs and social affairs.

Officers of the new association are: Louis F. Ross of the Cleveland Glider Club, president; S. Dietrich of the U. S. Aeronautical Club, vice president, and J. Janehar of the Case Aero Club, secretary-treasurer.

Cincinnati Aircraft Show Postponed

THE Cincinnati Aircraft Show has been postponed from February 8-14 to March 26-April 1, according to a recent announcement by the executive committee of the aircraft show. The original dates scheduled for the Cincinnati Aircraft Show conflicted with those of the Second Annual New York Aviation Show scheduled at New York City February 7-15, and the International Class A Aircraft Show scheduled at St. Louis, Mo., February 15-23. The executive committee of the Cincinnati Aircraft Show voted the postponement in the belief that a larger crowd would attend if there was no conflict with the dates of other aircraft exhibitions, and that weather conditions will be more favorable for outside demonstrations of aircraft at the later date.

During the week of the Cincinnati Aircraft Show a series of meetings is scheduled for aviation executives, airport managers, traffic managers, and others engaged in the various phases of the aeronautical industry. Among the subjects which will be discussed are advertising, merchandising, steels, aluminums, shop practices and airport management.

THE National Aircraft Products Company, aeronautical engineers and aircraft accessory manufacturers, was recently incorporated at Dayton, Ohio. The company will manufacture and distribute fuel and gas line fittings, pumps and strainers.

The officers of the National Aircraft Products Company, who formerly operated the National Steel Products Company, are as follows: S. J. Sorensen, president; T. M. Hiester, vice president and general manager; Harry M. Hiester, assistant general manager; G. A. Funkhouser, secretary; and P. Christensen, treasurer.

WALTER E. ALLEN has been appointed manager of the Curtiss Wright Flying Service in Toledo, Ohio, according to a recent announcement made by S. C. "Casey" Jones, president of the Curtiss organization. Mr. Allen is a former member of the Army Air Corps and served as a pilot during the war.

THE Issoudun Airports Corporation of Akron, Ohio, distributor of Bird planes manufactured by the Brunner-Winkle Aircraft Corporation of New York, recently awarded the Akron dealership for Bird planes to the Mankin-Ferris Company, Studebaker and Erskine automobile dealers of Akron.

The Issoudun Airports Corporation has started development of a 1,240-acre airport near Akron on the main road from Akron to Cleveland. Colonel Henry Breckinridge and Major Thomas G. Lamphier are sponsors of the new airport.

THE Thompson Aeronautical Corporation of Cleveland has appointed five new dealers in Ohio and Michigan to distribute engines and parts manufactured by the Wright Aeronautical Corporation and to maintain service stations for Wright engines.

The Wright dealers appointed by the Thompson company are: Curtiss-Wright Flying Service of Columbus, Ohio; Johnson Flying Service of Dayton, Ohio; Becker-Former Flying Service of Jackson, Mich.; the Furniture Capitol Airways of Grand Rapids, Mich., and United Air Service and Transport Company of Detroit.

D. V. STRATTON has been appointed sales director for the Great Lakes Aircraft Corporation of Cleveland, Ohio. Mr. Stratton was formerly manager of the foreign sales department of the Great Lakes Corporation.

COLUMBUS

[W. DONALD WALTER]

CAPTAIN BILL CENTNER, superintendent of Port Columbus, reports a very interesting trip to and from Los Angeles, where he attended the Western Airport Conference, at which he was one of the speakers. The trip was made both ways over the Transcontinental Air Transport. Captain Centner was scheduled to address the Engineers Club of Columbus on the evening of the day he returned. An officer of the Club called Centner at his office at Port Columbus an hour before the time scheduled for his talk, and was informed that the Captain had not yet returned, but would talk to him; a moment later connections were established, and Centner, flying in a T. A. T. ship fifty miles west of Columbus, assured the anxious club officer that he would be in Columbus an hour later to keep his appointment.

GENERAL SMEDLEY BUTLER, Marine Corps, was a recent aerial visitor to Columbus to deliver a lecture at Ohio State University. He was piloted by Lieutenant Schilt of the Marine Corps.

THE installation of night flying equipment at Port Columbus has been completed, and is in use every evening when the T. A. T. ship comes in from the west. At the present time the field is kept lighted each night until after the passing of three Pennsylvania evening trains, to demonstrate to rail passengers what is being done at the Port to promote safe night flying.

THE Standard Oil Company has been awarded the contract to furnish aviation gas and oil at Port Columbus. In submitting its bid, the company agreed to pay the city a flat sum for each gallon of aviation gas and oil sold. Included in the contract is the right to sell automobile gas and oil. Visiting pilots are now assured of gas and oil service at Port Columbus.

UNSEASONABLY cold weather has interfered little with Reserve activities at Norton Field. There has been more Reserve flying this fall than during any corresponding period since the field was established in 1923. Air Corps Reserve officers from all over the state have been keeping three PT's busy, and local officers have also been getting in considerable time. Three Columbus men, Lieutenants Phil Williams, William Mumm, Jr., and Ralph B. (Sam) Scott, all of the Air Corps Reserve, have had active duty training at the field within the last month. All the boys seem considerably interested in watching the blue crayon marks on Lieutenant McConnell's trick chart lengthen out. What we need now is a service type ship, or several of them—an 02H or an 01 would be particularly welcome.

CURTISS-WRIGHT FLYING SERVICE has announced the transfer of Jay R. O'Connell, regional sales director,

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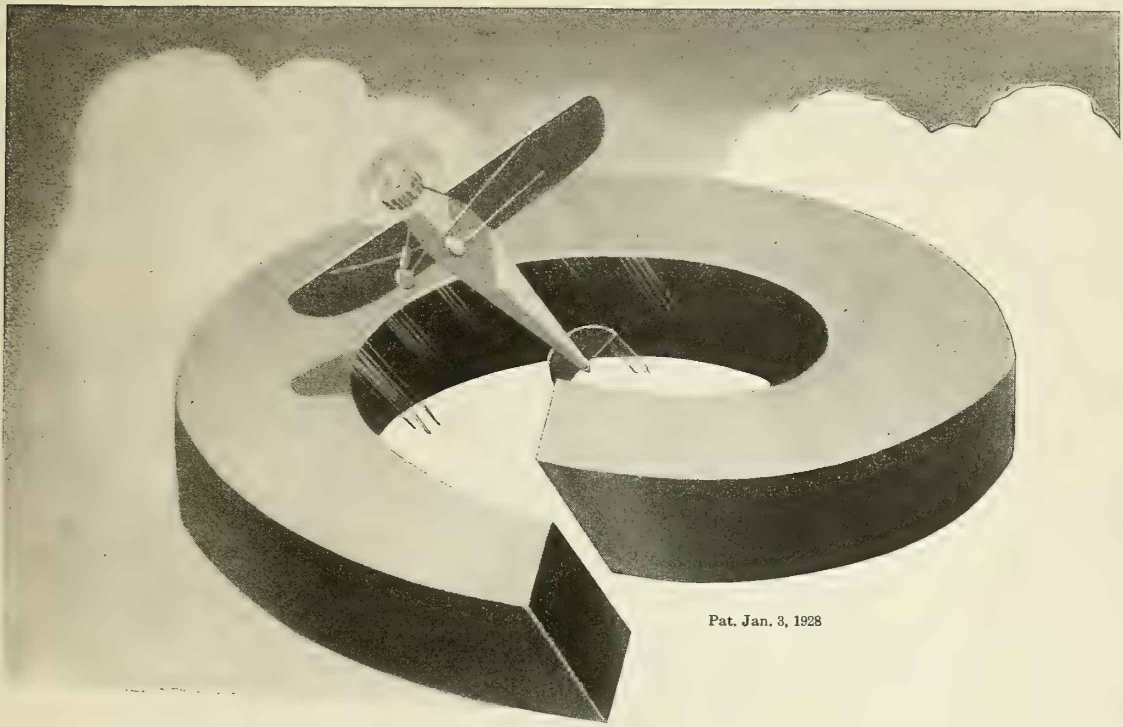

KANTLINKS COST MORE

AIRPLANE manufacturers are using Kantlinks—a high price spring lock washer. Leading manufacturers in other industries also have tested and adopted Kantlinks.

Although the cost is a little greater than that of plain coil lock washers—they are bought with the knowledge that their higher price is more than justified.

They do not interlink or tangle. They do not rust, and they have greater holding power.

In the long run Kantlinks—the higher priced—are found to be economical—and more important still, they are safe.

Prices and full information will be sent by any one of the manufacturers listed below.

Made and sold under license by the Kantlink Manufacturers:

The American Nut & Bolt Fastener Co.
Pittsburgh, Pennsylvania

Beall Tool Co.
East Alton, Ill.

The Mansfield Lock Washer Co.
Mansfield, Ohio

The National Lock Washer Co.
Newark, N. J., Milwaukee, Wis.

The Positive Lock Washer Co.
Newark, New Jersey

The Reliance Manufacturing Co.
Massillon, Ohio

3003

KANTLINK TRADE MARK **SPRING LOCK WASHERS**
DO NOT TANGLE DO NOT RUST

THEY PAY THEIR ENTIRE COST IN TIME SAVED - SOMETIMES EVEN MORE

(Ohio News continued)

from Columbus to St. Louis. Mr. O'Connell has been stationed at Columbus since the opening of the local Curtiss Flying Service unit last spring.

THE municipal hangar at Port Columbus has been completed and is in use. Several privately-owned ships are housed there, and a number of ships from Curtiss-Wright Flying Service have also been temporarily occupying the hangar, during repairs to the Curtiss hangar. The War Department has issued instructions to private owners that they must vacate the east hangar at Norton Field, and most of the ships formerly kept there are now in the municipal hangar at the Port.

PLANS are under way to remove the clubhouse of the Aero Club of Columbus from its present location at Norton Field to a new location at Port Columbus, and to enlarge the building. Since the flying at Norton Field is largely military, and since there is now more activity at Port Columbus, directors of the Club feel that the Port Columbus location will enable it to more fully serve the interests of the members.

INDIANA

THE *News-Sentinel*, newspaper published at Fort Wayne, Indiana, has purchased a Ryan Brougham, manufactured by the Ryan Aircraft Corporation of Robertson, Mo. The plane will be used for news gathering and the accommodation of advertisers. The ship is a six-place cabin monoplane powered with a Wright Whirlwind 300 engine.

PLANS for a $100,000 administration building at the new Municipal Airport at Indianapolis have been completed. The building is planned as one of the most modern of its type. It will be 142 by 125 feet and will be of fireproof construction with a buff brick finish. It will be two stories high. Toward the front will be a tower where all electrical equipment necessary to the operation of floodlights, beacons and other signals will be housed. A hangar will run the full length of the building. The United States aeronautical meteorological department will occupy space on the hangar section and the second floor will be given over to offices. Air mail, express, waiting rooms and rest rooms are provided in the plans.

ILLINOIS

[MRS. EDITH TILTON]

NORTHWEST AIRWAYS, operating the air mail route between Chicago and the Twin Cities, recently obtained permission to establish an air mail service between Rockford, Illinois, and Milwaukee, Wisconsin, stopping at Janesville and Beloit, Wisconsin. The announcement came from the Post Office Department on December 10 after a conference between L. H. Britton, vice president and general manager of Northwest Airways, and Earl B. Wadsworth, superintendent of air mail.

Tentative arrangements call for a plane to leave Milwaukee each morning at 7:30, making stops at Janesville and Beloit, reaching Rockford at 8:30, with the plane leaving Rockford at 5:15 each evening on its return trip to arrive an hour later at Milwaukee. A survey made by the Chamber of Commerce reveals the new line would be assured of 1,900 pieces of mail daily, 1,200 originating at Rockford, 400 at Janesville and 300 at Beloit.

This routing of air mail was suggested by the local Chamber of Commerce in preference to a plan of stopping the direct route planes which pass twice daily over the city of Rockford on their flights from Chicago to the Twin Cities.

The Milwaukee routing will connect with the Chicago, Milwaukee and Minneapolis mail plane which leaves Milwaukee at 6:37 o'clock each night, arriving in Chicago at 7:30, in time to make connection with the 8 o'clock transcontinental air mail plane. Forty Rockford firms have requested the air mail service.

CHICAGO, Ill., has been designated as the site for the 1930 National Air Races and Aeronautical Exhibition by the National Aeronautic Association, which recently selected the bid for the 1930 Air Races made by Chicago over those made by Wichita, Boston, Miami and other cities throughout the country. Tentative plans call for an eight-day meet during the week before Labor Day.

The Chicago Air Race Corporation has been organized for the purpose of raising $200,000 to underwrite the 1930 National Air Races. A total of $137,500 toward the fund has been subscribed by the corporation. The officers of the Chicago Air Race Corporation are as follows: Col. Robert M. McCormick, chairman of the board; Earle H. Reynolds, president; Frederick H. Rawson, treasurer, and Capt. M. M. Corpening, secretary.

AN airport division has been added to the organization of the Burrell Engineering and Construction Company of Chicago, Ill., with Harold Ambler as manager of the new branch of activity. Mr. Ambler was formerly associated with the Leonard Macomber Construction Company.

THE Sikorsky Aviation Corporation has opened a sales office in Chicago to take care of its business in the Great Lakes district. W. H. H. Vail, a former Army flier, has been appointed district manager.

MICHIGAN

[KARL F. ZEISLER]

THE Aircraft Bureau of the Detroit Board of Commerce has compiled a directory of Michigan aviation which shows a total of 24 concerns manufacturing aircraft, six manufacturing aviation engines, 58 manufacturing aircraft accessories and two manufacturing gliders in the state. The aircraft makers include some of the nation's leaders: the Stout Metal Aircraft division of the Ford Motor Company, the Stinson Aircraft Company, the Buhl Aircraft Company, the Verville Aircraft Company and the Aircraft Development Corporation. Engine manufacturers include Packard, American Cirrus, Warner and Szekely, manufacturing a wide variation of types from the 24-cylinder Packard to the three-cylinder Szekely. The directory also lists eight dealers and distributors of aircraft in the Detroit district and ten organizations throughout the state devoted to aircraft activities.

THE Michigan State Board of Aeronautics has issued temporary licenses to all fields and schools operating in its jurisdiction. Questionnaires were sent to airports and schools for the issuance of temporary licenses. The Board will send inspectors around the state before permanent licenses will be granted.

THE Kalamazoo city commission has leased land on Lindbergh Field, the city's municipal airport, to the Scott Engineering Company, which will operate a complete repair service depot for planes. The Scott company plans the erection of a $10,000 building housing a shop and a stock of parts for standard aircraft.

KOHLER Aviation Corporation has made Muskegon a stop on its Grand Rapids-Milwaukee passenger line, following the completion of facilities at the Muskegon County Airport. Rail connections at Grand Rapids and Milwaukee are made by the Kohler planes.

Pontiac Municipal Airport Completes Developments

WITH the dedication services of the new Thompson Aeronautical Corporation's hangar, shops and offices at Pontiac on November 27, the first anniversary of the opening of the Pontiac Municipal Airport, the Pontiac field has completed qualifications for A1A rating under Department of Commerce regulations, and the city has been notified by A. Pendleton Taliaferro, chief of the airports division, that the rating will be awarded in the near future. The Thompson company, operating the Chicago-Bay City air mail line, C. A. M. 27, has now established state headquarters at the Pontiac field in its new $110,000 building. Offices have been moved from Kalamazoo, and the servicing department for its fleet of land and amphibion planes has been moved from Detroit. The company distributes and services Wright engines in Ohio, Indiana and at the new Michigan shop, which is completely equipped to handle repair and service work. A training school will shortly be opened at the field. Ralph De Vere is Michigan superintendent for Thompson Aeronautical Corporation.

Three commercial companies are now maintaining headquarters at the Pontiac air-

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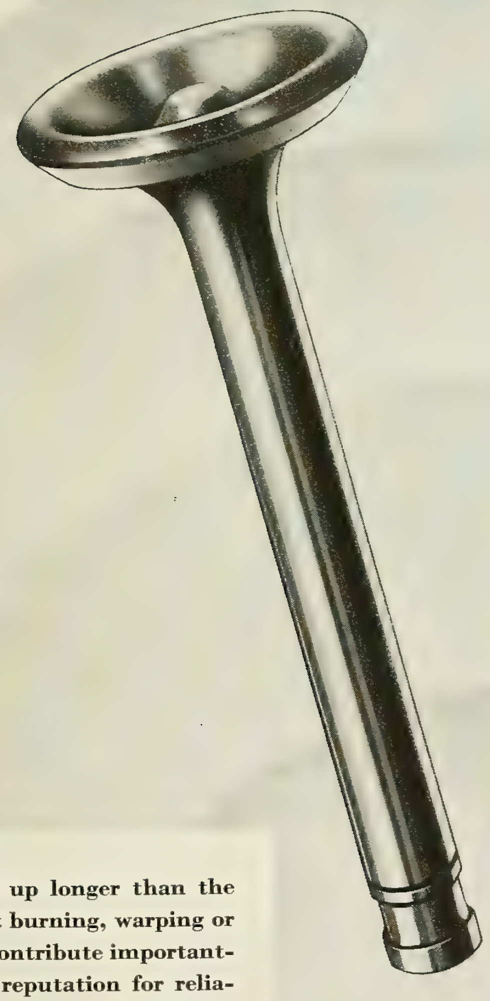
PERFECT SEALING—HIGHER *CEILINGS*



Valves that stand up longer than the average — without burning, warping or excessive wear — contribute importantly to an engine's reputation for reliability. Perfect valve sealing maintains maximum engine power—affords maximum speed and lift for planes.

Thompson Valves are designed, both metallurgically and structurally, to withstand the extreme stresses of air service. They are used today in 95 per cent of all American-built airplane motors.

THOMPSON PRODUCTS, INCORPORATED
General Offices: Cleveland, Ohio, U. S. A.
Factories: Cleveland and Detroit

TP
TRADE MARK

Thompson Valves

Original Equipment in 95% of American-Built Aero Motors

(*Michigan News continued*)

port, those other than the T. A. C. being Skyways, Inc., and the J. A. N. Aircraft Company. The J. A. N. firm is state distributor for Mono aircraft. A total of $345,000 is now invested in the Pontiac field in land, equipment and buildings.

THE Michigan cities of Manistee, Muskegon, Ludington, Cadillac, Traverse City, Charlevoix and Petoskey have petitioned the Thompson Aeronautical Corporation to extend its Chicago-Muskegon line service to them, making a line along the east shore of Lake Michigan.

THE Davy Aircraft Company of Flint, Mich., has been appointed distributor in the state of Michigan for the Kari-Keen Aircraft, Inc., of Sioux City, Iowa.

DETROIT

Sales Personnel of Detroit Aircraft Subsidiaries Announced

APPOINTMENT of personnel for the West Coast distribution of all aircraft produced by the Detroit Aircraft Corporation was recently announced by E. S. Evans, president of the company. Offices have been opened in the Roosevelt Building at Los Angeles, Calif. James E. Appleby, who has been appointed West Coast sales representative of the Detroit Aircraft Corporation, will be in charge of the offices.

Theodore Schleuter will head the sales department of the Ryan Aircraft Corporation, of Robertson, Mo., a division of the Detroit corporation. C. A. Barber will be in charge of sales of the Lockheed Aircraft Corporation, of Burbank, Calif., and W. A. Hansley has been appointed sales director of the Parks Aircraft Corporataon and Parks Air College, of St. Louis, Mo., subsidiaries of the Detroit Aircraft Corporation.

WILLIAM B. Mayo, chief of the Airplane Division, Ford Motor Company, was elected president of the National Glider Association for the year 1930 at the recent annual meeting of the directors of the association. Edward S. Evans, former president of the association, was elected honorary president for life.

A report submitted at the meeting showed that forty-three new glider clubs throughout the country are in the process of formation. Letters were read from the chambers of commerce of Los Angeles, Calif., St. Petersburg and Tampa, Florida, urging the selection of terrain in those localities for the national contest.

THE one hundredth thousandth passenger on planes operated by Stout Air Lines was carried on December 11 on a flight from Detroit to Cleveland. Between September 6, 1928, and December 11, 1929, Stout Air Lines carried 50,000 passengers on the routes between Detroit, Cleveland and Chicago without accident. Planes of Stout Air Lines flew 900,000 miles in carrying the first 100,000 passengers.

Stout Air Lines started operations on August 1, 1926, with an experimental passenger service between Detroit and Grand Rapids, Mich. After a year's operation, the line was suspended. On November 1, 1927, the Detroit-Cleveland line was started. Service on this route has been extended to three planes daily each way with the exception of Sunday. The Detroit-Chicago line was started on November 1, 1928. There are now two planes each way daily except Sunday on this division. Planes of the Stout company stop at Toledo, Ohio, Battle Creek, Mich., Kalamazoo, Mich., and South Bend, Ind., in addition to the principal fields at Detroit, Chicago and Cleveland.

Miss Bertha C. Flo, sister of the head of Flo Flying Service, Ann Arbor, Mich., and a flying enthusiast

The company uses Ford trimotor transport planes powered with Pratt and Whitney Wasp engines of 425 horsepower each.

AMERICAN CIRRUS ENGINES, INC., of Belleville, N. J., has moved its equipment to Marysville, Mich., where larger quarters have been acquired. The new location provides 300,000 square feet of floor space and a property of 150 acres.

AVERVILLE air coach was delivered recently by air to Henry du Pont at Wilmington, Delaware, and was afterwards exhibited in the First Baltimore Aircraft Show from December 9 to 14. On its flight from Detroit to Wilmington the plane was flown by many pilots at the various fields visited. Flying fields located at New York City, Hartford, Conn., and Philadelphia were visited by the plane en route from Detroit.

CONSTRUCTION of a hangar to house the planes of the National Guard has been started at the Detroit-Wayne Airport under an appropriation of $116,000 which was allowed on November 18.

OFFICERS of the Schlee-Brock Corporation of Detroit have announced the inauguration of a "fly-it-yourself" airplane service in the cities touched by its activities. The company plans to have three types of planes available to pilots at Detroit, Minneapolis, St. Paul and Duluth. Small open biplanes, closed-cabin Bellancas, Lockheeds and a trimotored Bach may be rented from the Schlee-Brock Corporation at the Detroit field. Standard training planes and Lockheeds on skis will be available at Duluth, and Lockheeds and cabin Travel Airs equipped with skis will be maintained at the Twin Cities for the service.

THE Detroit Aircraft Corporation of Detroit was host recently to R. Arisaka of the Kawanishi Machine Works, Kobe, Japan, and to General Manuel T. Quinones and Capt. Benjamin Mendes R. Heads of the Colombian Air Ministry. The representatives of the foreign organizations were in this country seeking the manufacturing rights for American aircraft in their countries.

THE Detroit Aircraft Corporation has completed arrangements with the Commercial Investment Trust Corporation of New York City whereby the investment company will finance all wholesale and retail sales made on the time payment plan by the Detroit corporation and its distributors and dealers.

GLENN MUFFLY, consulting engineer for Copeland Products, Inc., has been appointed to the executive staff of American Cirrus Engines, Inc., a unit of Allied Motor Industries, Inc., according to a recent announcement by William Robert Wilson, chairman of the board of Allied Motor Industries, Inc.

WISCONSIN

[WILLIAM SCOLLARD]

COL. L. H. BRITTIN, vice president and general manager of Northwest Airways, announced recently that his corporation will erect a new hangar at the Milwaukee County Airport. The company has applied to the county for a site for a proposed hangar and waiting station, which will be 100 by 100 feet and will be constructed of brick and steel.

DESPITE inclement weather, the new Milwaukee-Muskegon cross-lake air service has been functioning well. The first special express was carried on December 3rd. This service, as an adjunct to the Milwaukee-Grand Rapids schedule, brings Milwaukee and Muskegon only a short time apart.

AN extensive improvement of the county airport at Milwaukee will be undertaken after January 1st, when the Milwaukee county board committee on highways will take charge of all improvements. The committee's first move will be to construct a concrete loading and unloading depot at one end of the Milwaukee County Airport. This platform would front a passenger station and an administration building. Concrete or other hard surface runways that would run courses parallel to cinder runways and that would facilitate

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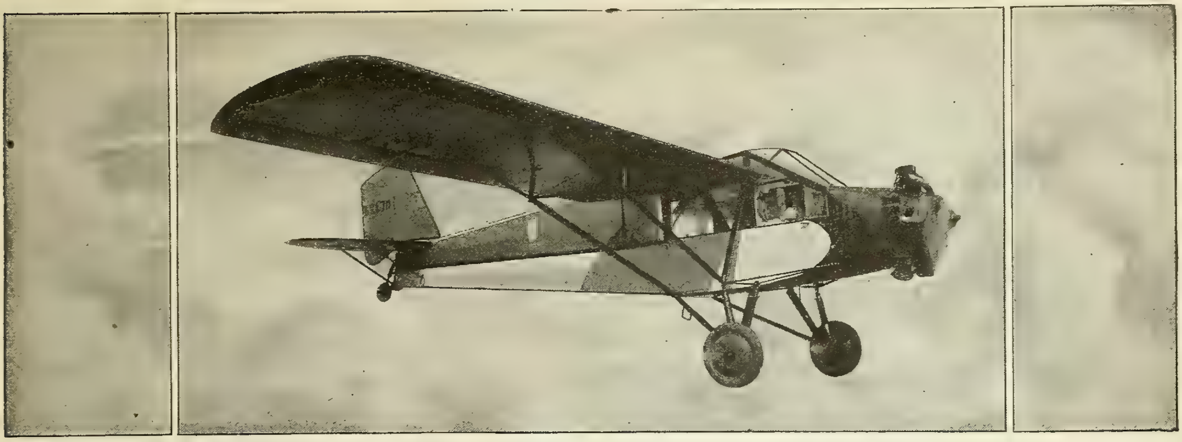


THE NEW B/J--The First Full Vision Plane

NOW—an enclosed plane without a blind spot. The B/J engineering staff, drawn together for the pioneering of new designs for military planes, has carried this same original designing into a two-place tandem monoplane for commercial, private or training use.

The result is that the first commercial B/J embodies a new wing arrangement that affords full vision in all directions.

Seated at the controls of the new B/J, the pilot commands a full, clear view . . . overhead . . . above and below the wing on either side . . . and to the rear. By a movement of the eye or turn of the head he views the entire cyclorama of land and sky.

The ample side windows, of shatterproof glass, may be opened or closed at will.

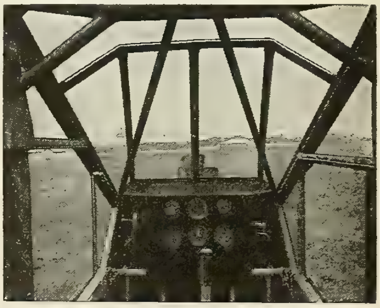
Combined with this unique full vision design are remarkable stability, easy yet positive controls, and numerous other features which make the B/J especially suited for student training or private flying.

The advanced design of control surfaces and gear afford a degree of manoeuverability and control comparable to that of military aircraft. High cruising speed, ample fuel capacity and relatively small fuel consumption result in a wide cruising range. A high angle of climb, slow landing speed and wheel brakes make the plane well adapted for small field operations and for private use.

Setting new standards in ease of handling and in safe, comfortable, care-free flying, the B/J is a "Pacemaker of the Air" in salability as well as in performance. Write for further information about this new B/J, and about distributor territories still open.

A view inside the comfortable, roomy cabin of the new B/J, showing the all-window construction which begins at a level with the pilot's waist and extends above the wing, back beyond the rear seat and across the top.

The pilot of the new B/J has only to move his eyes or turn his head to command a full, clear view in all directions—overhead, above or below the wing on either side, or to the rear.



Taking off or landing, a broad, clear view of both land and sky spreads before the pilot of the new B/J. Equipment includes clock, compass, tachometer, air speed indicator, altimeter, oil pressure, temperature and gasoline gauges.

BERLINER JOYCE AIRCRAFT CORP.

BALTIMORE MARYLAND

"PACEMAKERS OF THE AIR"

(Wisconsin News continued)

take-offs and give a runway of 150 feet or more in width, are also under consideration.

EXPERIMENTS for the purpose of eliminating exhaust noises were recently conducted by the Comet Engine Corporation of Madison, Wisconsin. During the tests a ring was installed at the exhaust manifold and the exhaust pipes were led in an equicurve spiral to the ring which they entered as the jets enter a turbine engine. Engine exhaust noise was eliminated to a great extent by the arrangement, according to John H. Geisse, chief engineer of the Comet Engine Corporation.

THE following directors were elected at a recent meeting of the Chippewa Aircraft Corporation at Chippewa Falls, Wis.: Guy Van Vuren, Robert Wiley, Jr., J. S. Truax, Alvin O. Rasmus, and Ole Larson. Officers elected were: Guy Van Vuren, president, Ole Larson, vice president, and Robert L. Wiley, secretary-treasurer.

THE first demonstration flights of the Pheasant Traveler, manufactured by the Pheasant Aircraft Company, Inc., of Fond Du Lac, Wisconsin, were recently made at the Fond Du Lac airport. During the exhibition flights, the ship climbed from 500 feet to 6,500 feet and returned again to 500 feet, the pilot flying the plane without touching the controls with the exception of the throttle and the rudder, according to a statement of Pheasant officials.

The Pheasant Traveler is a one or two-place cabin high-wing monoplane with a weight of 575 pounds, a wing span of 31 feet 6 inches, and a length of 20 feet 6 inches. The plane is powered with a 55-horsepower, four-in-line air-cooled engine, and has a high speed of 110 miles per hour and a landing speed of 35 miles per hour.

PLANS are under way to double the manufacturing capacity of the Young Radiator Company of Racine, Wisconsin, and additional machinery has been installed at the factory in anticipation of increased production, according to F. M. Young, president of the company. Present plans include an increase of the personnel in the accounting, purchasing and engineering departments.

MINNESOTA

[LYLE F. YOUNGSTROM]

A BID of $74,000, submitted by the Baumeister Construction Co., general contractors of St. Paul, was the lowest of fourteen offers opened by the City Council Dec. 3 for the construction of a new municipal hangar at the St. Paul Airport. Bids for plumbing, electrical work and other conveniences of the proposed building, amounting to approximately $20,000, were also opened and will be considered later.

The new hangar, on which the estimated cost of the completed structure was $97,000, is to be of steel and tile construction. It will be 115 by 200 feet and will house about 30 planes, according to the plans approved by the council. The new structure will be on the west side of the field just west of runway No. 3 and about 200 feet north of runway No. 1. It is expected to be ready for use by April 1. The present hangar is 100 by 100 feet.

Excavation work for the Northwest Airways $100,000 hangar, passenger terminal and administration building at the St. Paul airport was recently completed and rapid progress is being made on the steel and brick structure which is rising. The terminal building will be completely equipped and will be used as headquarters of the Northwest Airways company and terminal for the passenger, express and air mail line which it operates from Chicago to the Twin Cities. It is to be completed by February 1. A concrete apron is being laid in front of the Northwest Airways hangar. At present Northwest Airways uses the Wold-Chamberlain airport, the Minneapolis municipal airport, as its terminal. When the new hangar is completed Northwest Airways will have both its business headquarters and its terminal in St. Paul.

Final condemnation orders on 108 acres of land for an addition to the municipal airport were passed last month by the City Council. An area of 800,000 square feet has been filled this year and filling operations are being rushed to complete ground surface for the second paved runway, upon which work is half finished.

A REQUEST for $40,000 to finance the construction of an administration building at the Wold-Chamberlain Field was submitted recently to the Board of Estimate and Taxation by the Minneapolis Park Board at its bi-monthly meeting. Plans for the building have been approved by the aviation committee. The proposed building will include offices for the airport manager, the weather bureau and other services and will serve as headquarters for all airport activities.

RADIO equipment by which its planes may keep in touch with ground stations in St. Paul, Minneapolis, Chicago and intermediate points, is to be installed by the Northwest Airways, Inc., Colonel L. H. Brittin, vice president of the company, announced December 6.

THREE new N2C-1 landplanes were recently obtained by the United States Naval Reserve aviation unit at Wold-Chamberlain Field. Lieut. Frank E. Weld, commanding officer, and Ensigns M. D. Crawford and J. H. Sparboe, flew the ships from Buffalo.

PURCHASE of the Northern Minnesota Flying Service at Virginia was announced recently by Mark M. Hurd, president of the Great Northern Aviation Corporation. This purchase completes another link in the chain of aviation schools and flying services which this company has begun for the purpose of establishing outposts for aviation instruction, airplane distribution and other enterprises in northwest cities.

MORE than 140 students are registered for the course in aeronautics offered at the University of Minnesota. This course is required by the Navy Department for those applying for flight and commission training from the state institution. Fifteen selections of qualified men have been made for Navy aviation training and 34 applications are pending.

[ARTHUR G. PATTERSON]

PLANS for the construction of facilities and for development of the Duluth Municipal Airport have been completed by Leonard Macomber, Inc., airport engineers of Chicago. According to the plans, the airport fully developed would cost the city $264,385 and would include construction of an administration building, hangar, paving runways, construction of an air park and installation of night lighting equipment. For long distance lighting this company recommended a 100,000-candlepower airport beacon.

DULUTH has been selected as a stop-over point for the nineteen Army airplanes of the First Pursuit Group, Selfridge Field, which are to fly a cross-country winter tactical mission, according to Lieut. Walter Richards, advance man who was in Duluth the early part of December in conference with city, county, and Chamber of Commerce officials regarding arrangements for the flight. The planes are expected to arrive in Duluth at the Municipal Airport on January 12th. The fleet will consist of 18 pursuit planes and one transport plane, all of which will be equipped with skis. The personnel of the group will collect data on the difficulties of long-distance missions, over existing airways and under sub-zero conditions.

[H. A. LINDBERGH]

THE Great Northern Glider Club was organized recently with Herbert Erickson, president; C. W. (Speed) Holman, first vice president; P. A. Lendway, second vice president; E. A. Keyes, third vice president; C. K. Blomquist, secretary, and Patricia O'Neill, treasurer. Headquarters are maintained at the Great Northern Aviation Corp. building at 568 University Ave., St. Paul. One glider has been purchased and others will be added to the equipment of the organization.

THE Minneapolis board of appraisers recently valued 240 acres of land, which have been proposed as an addition to the present 300 acres of Wold-Chamberlain Airport at Minneapolis, at $133,780. This estimate, which does not include the undetermined cost of condemnation proceedings, includes $109,450 for the land and $24,300 for the improvements to be made on the addition.

THE Dahlquist Construction Company of Minneapolis recently completed the construction at the Duluth Municipal Airport of two 2,650-foot runways 500 feet wide, and a 1,500-square foot intersection

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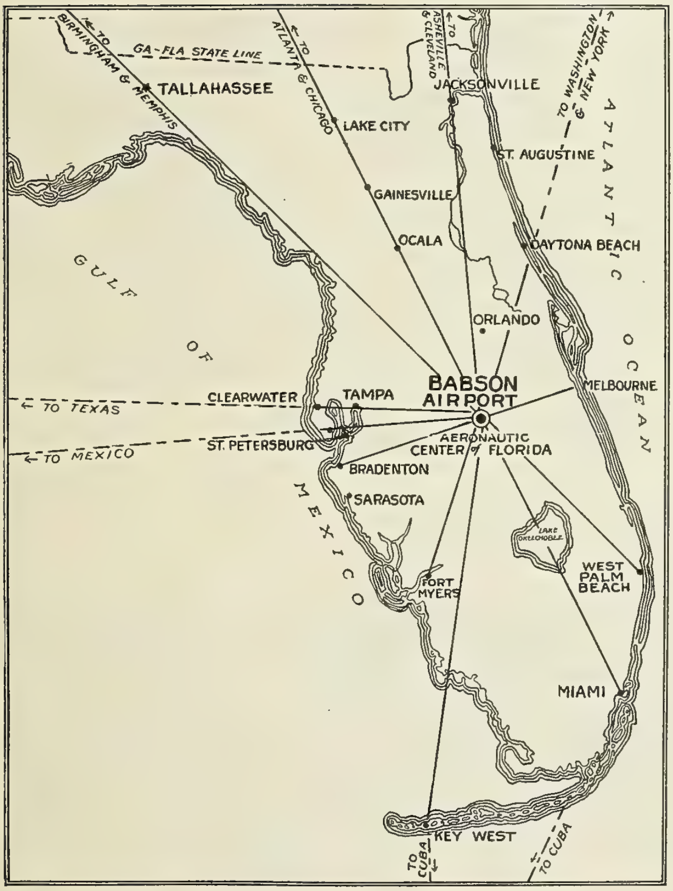
FLORIDA AIRPORT
FOR SALE



DETAILS

We are building in the center of Florida, near Lake Wales, Mountain Lake and Winter Haven, a modern airport, suitable for winter flying school, sales office, etc., 320 acres of high land on a new hard road and bordering also on a large lake. Over 40 acres cleared. Other improvements pending. Will sell very reasonably to right party. This location should ultimately become the center of all flying in Florida.

Suitable for
Airplanes, Seaplanes and Zeppelins

For further information address

BABSON FINANCE COMPANY

BABSON PARK MASSACHUSETTS

(Minnesota News continued)

at the triangle of the runways. These improvements make the Duluth airport an all-way field. The cost of the improvements was $78,000 and included the grading of a roadway to the field.

CHARLES W. HOLMAN recently made a flight from Washington, D. C., to Minneapolis, a distance of approximately 1,000 miles, in five hours and ten minutes, establishing an average speed of 194 miles per hour on the flight. Mr. Holman, who is operations manager of Northwest Airways, flew a Laird Speedwing on the flight.

AN airplane patch kit has been devised by Joe Edeskuty of Minneapolis, Minn. The kit consists of a folded sheet of tissue paper containing eleven patches of airplane fabric. The patches are of various shapes and sizes to correspond with tears or rents which might occur in the fabric of airplane wings and fuselage.

SKIS manufactured by Federal Aircraft Works, Inc., of Minneapolis, Minn., have been approved by the Department of Commerce for installation on planes, according to a recent announcement made by officials of Federal Aircraft Works, Inc.

IOWA

[R. W. MOORHEAD]

NEW ALBIN, Iowa, located in the northeast corner of the state, recently completed the establishment of its airport. J. W. Kuhnel, government engineer, superintended the construction of the landing field.

JACK WALTON was recently elected president of the Des Moines Chapter of the National Aeronautic Association at the annual business meeting. Other officers include Charles Gotschet, vice president, and F. K. Henkle, secretary and treasurer. Members of the board of directors are George Yates, Ed Lindeen, Ralph Young, Russell Ford and F. C. Anderson.

THE aerial equipment of the University of Iowa, located at Iowa City, has been augmented by a biplane of the pursuit type, given to the University's aviation department by the Government. The craft will be used for structural study in connection with the school's aviation course. It was obtained from Fairfield, Ohio, and was released from air mail service less than a year ago.

THE Yellow Cab Airways Co., Des Moines, has announced that it will renew its lease at the Des Moines Municipal Airport. The present lease expires January 10, 1930, but contains option providing for renewal. The lease gives the company the right to use the hangar and field and the exclusive right to the sale of gasoline and oil at the airport.

NEBRASKA

[JAMES R. LOWELL]

NEW distributors of the Arrow Aircraft and Motors Corporation of Lincoln, Neb., include J. B. Regan, oil operator who has leased an airport at Shawnee, Okla., and who will serve the Arrow sales organization in that territory. Mason Colbert of Nebraska City will handle the Arrow franchise in Nemaha and Otoe counties, Nebraska. Northwest Airways, Inc., Seattle, Wash., has contracted for the Arrow distributorship over the north one-third of the Pacific Coast territory.

AN ordinance was passed in December by the city council of Lincoln, Neb., establishing the Municipal Aviation Field Department of Lincoln and authorizing the department to buy and sell gasoline, oil, electric current, water and other commodities used in the operation and maintenance of the municipal aviation field, and to collect rentals, and to use money so obtained for the operation of the municipal airport.

Rules were adopted governing the operations of the municipal aviation field department. According to these regulations, the manager must keep account of all business transacted by the department, showing the cost of gasoline, oil, electric current, water, freight, demurrage, delivery, and all other items of expense together with a complete statement of all receipts. He must deposit with the city treasurer all money received or collected by the department which shall be placed in the aviation field fund by the city treasurer; and all money so received and deposited may be used in the operation and maintenance of the municipal aviation field. Mayor Love is in charge of the department as superintendent of the municipal field and has the aid and advice of an advisory board, of which Verne Hedge is chairman.

SIDLES AIRWAYS, INC., of Lincoln, Nebr., recently announced plans for the construction of a $500,000 airport near Havelock, Nebr. The field will be known as "Union Airport," and the first unit to be constructed will be a $50,000 hangar, for which contracts have been let. A half-section of land running a mile east and west and a half-mile north and south has been acquired as the airport site, and a large area of the field has already been seeded to grass. Completion of the hangar will be followed by erection of a $75,000 administration building early in 1930, according to present plans.

The hangar will be 120 feet long, 100 feet wide and 22 feet high. The north side of the structure will be devoted to repair and service shops and a parts department. The administration building, which will be two stories in height and 120 by 30 feet, will house the offices of the port officials, waiting room for passengers, a modern cafe, and quarters for pilots. Both buildings will be constructed of brick with stone trim, using a style of architecture which will be followed in all future buildings at the port.

HASTINGS, Nebr., recently approved bonds for a $50,000 municipal field. A $100,000 aircraft corporation, to be known as the Great Plains Aircraft Co. was formed at Hastings recently and will engage in flying activity.

A LOCAL chapter of the National Aeronautic Association has been formed at Falls City, Neb. Officers are E. W. Simpson, president; Jean Cain, vice president; George S. Lyon, treasurer; Henry Schepman, secretary; and Wilbur Prichard, C. A. Johnston, Norman Heinzelman, Amos Yoder, Dr. C. L. Hustead and T. A. Lonam, directors. The chapter has a membership of twenty-eight.

OMAHA

[CHARLES P. RODMAN]

RAPID AIR LINES of Rapid City, South Dakota, recently bought the Omaha municipal hangar at the Omaha Municipal Airport for the sum of $20,000. This building was built about two years ago by the Omaha Post of the American Legion, which raised subscriptions totaling $28,000. Commissioner Noyes, in behalf of the City of Omaha, also made a lease with the Rapid Air Lines for a ten-year period whereby the company will be allowed the use of the landing field for a rental of $500 the first two years and then at a rate to be determined. The lease at the end of three years shall not be less than $500 annually nor more than $1,000. Rapid Air Lines also secured the right to sell gasoline on the field and is to give the city a royalty of one cent a gallon for all gas sold.

Officers of Rapid Air Lines have asked that runways be built, that trees be cut and other improvements made. The city will probably follow these suggestions as there is about $28,000 available for developments at the field in 1930. Last year the city voted $250,000 for the construction of the airport; the budgeted $50,000 and an additional $22,000 was spent on improvements during 1929, so that only $28,000 will be available in 1930.

The management of Rapid Air Lines is planning the establishment of an airline to Winnipeg and St. Paul from Omaha. The line as proposed would pass through Sioux City, Sioux Falls, Watertown, Fargo and Grand Forks. All these cities are now on lines operated by locally controlled companies in which the Rapid Air Lines is interested.

L. C. Hawley, assistant general manager of the Omaha branch of the American Credit Corporation, recently announced that his company has arranged with Rapid Air Lines to finance plane sales made in Omaha. The American Credit Corporation has home offices in Baltimore.

THE Midwest Aviation Corporation with headquarters in Omaha, Nebr., recently completed a hangar on the Omaha Municipal Airport. Lawrence Enzminger, formerly of the Union Pacific Railroad, is president of the firm. Mr. Enzminger has

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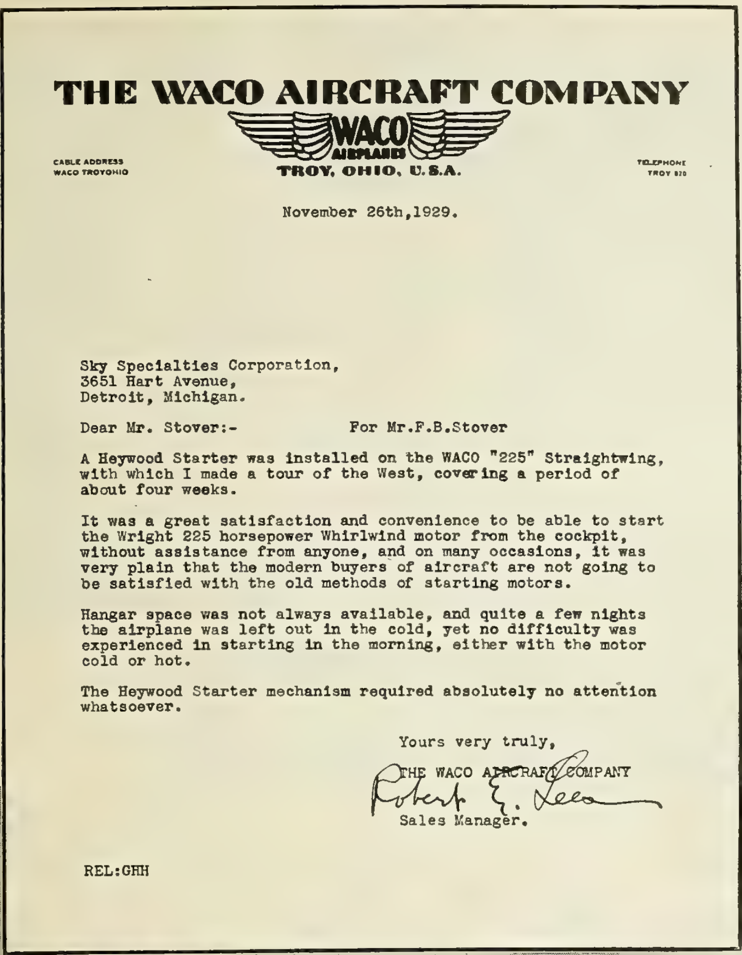


THE WACO AIRCRAFT COMPANY

WACO AIRPLANES

TROY, OHIO, U.S.A.

CABLE ADDRESS
WACO TROYOHIO

TELEPHONE
TROY 820

November 26th,1929.

Sky Specialties Corporation,
3651 Hart Avenue,
Detroit, Michigan.

Dear Mr. Stover:- For Mr.F.B.Stover

A Heywood Starter was installed on the WACO "225" Straightwing, with which I made a tour of the West, covering a period of about four weeks.

It was a great satisfaction and convenience to be able to start the Wright 225 horsepower Whirlwind motor from the cockpit, without assistance from anyone, and on many occasions, it was very plain that the modern buyers of aircraft are not going to be satisfied with the old methods of starting motors.

Hangar space was not always available, and quite a few nights the airplane was left out in the cold, yet no difficulty was experienced in starting in the morning, either with the motor cold or hot.

The Heywood Starter mechanism required absolutely no attention whatsoever.

Yours very truly,

THE WACO AIRCRAFT COMPANY

Robert E. Lees

Sales Manager.

REL:GHH

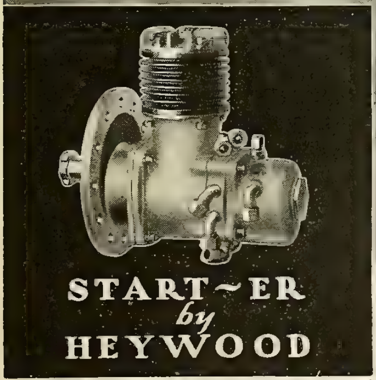
Every month more leading aeronautical executives, authorities and industrial leaders endorse the faithful operation of the Heywood Starter as a dependable starting unit.

Robert E. Lees, sales manager of the Waco Aircraft Company, whose Waco "225" Straightwing is Heywood equipped, sends the voluntary letter reproduced herewith.

Mr. Lees' letter tells the Heywood story. Dependable under all circumstances because of its injection principle—few moving parts—simple design.

Write for complete information on the industry's greatest and most advanced starter.

SKY SPECIALTIES CORPORATION
3651 HART AVE. DETROIT, MICH.



HEYWOOD STARTER

New model Verville Air Coach manufactured by the Verville Aircraft Co.

(Nebraska News continued)

received the appointment as manager of the Grand Island, Nebr., airport. His company now has a sales agency in Omaha and will establish one in Grand Island immediately.

THE Pioneer Aircraft Company of Omaha plans extensions the first of the year including the establishment of a downtown office in Omaha, and the appointment as sales manager of H. R. Bruning, former traffic manager of the Universal Airlines. A hangar will be constructed before spring. Frank Grace is president of the company and F. D. Bowhan is chief pilot. There is a movement to secure a field northwest of Omaha where the ground is high and level. It is urged this would get away from the fog and soft ground that exist at the municipal field.

THE Omaha-Wichita Air Lines has petitioned the Government to establish air mail service on the route between Omaha and Wichita, via Lincoln, Manhattan, and Topeka, Kas. Should this request be granted a regular passenger service would be established immediately.

BELLEVUE, Nebraska, is again seeking funds with which to secure an airport. Bellevue is six miles south of Omaha and near the present air landing field of Fort Crook. The plan of the civic leaders is to secure 400 acres of land and make it the landing field for the Omaha district. Two sites are under consideration and it now seems only a question of time until the field will be in operation.

One of these sites is level and has excellent drainage and visibility. Seven runways, one a mile long and the others 3,700 feet long, could be laid out on this site.

MISSOURI

CONSTRUCTION of a new club building has been completed by the Jefferson School of Aviation at the Jefferson City, Mo., flying field. The building is designed to accommodate fifty students and includes private rooms for transient pilots and a large lounge room on the first floor. The company has also completed the construction of a mechanics' building equipped with shop facilities for the repairing and rebuilding of airplanes and aircraft engines.

The Jefferson School organization has been appointed distributor for the Curtiss-Wright Flying Service, and E. B. Gray, territorial sales manager of the Curtiss-Wright unit at St. Louis, has been appointed operations manager at the Jefferson school. Mr. Gray was formerlw chief pilot for the Inland Aviation Company, of Kansas City, Mo.

A. H. THURMOND has been appointed distributor for the Bellanca Aircraft Corporation in the territory including Kansas and Missouri, with the exception of St. Louis. He will operate from Fairfax Airport, Kansas City.

C. R. SEAMANS and J. L. Balmat have been appointed dealers in St. Joseph, Mo., for the Barling NB-3 monoplane manufactured by the Nicholas-Beazley Airplane Co., Inc., of Marshall, Mo.

A BARLING NB-3 monoplane with a Kinner engine of ninety horsepower was recently test-flown at the factory of the Nicholas-Beazley Airplane Co., Inc., of Marshall, Mo., according to an announcement by Russell Nicholas, president of the company. The plane developed a top speed of 130 miles per hour and climb of 1,500 feet per minute in the tests. The addition of this motor installation to the present line for use in high altitude is being contemplated.

Barling planes now come equipped with the Velie 55, the LeBlond 60 and the Genet engine of 80 horsepower. All three models are of the low wing all-metal three-place type.

Facilities of Parks Air College

PARKS AIR COLLEGE is located at its own field, Parks Airport, about three miles south of East St. Louis, Ill., and is twenty minutes' drive from the downtown district of St. Louis. It is situated on a broad plain just west of the Mississippi River. The school was approved by the Department of Commerce on July 15, 1929, to give training for private, limited commercial and transport pilots' licenses and ground school work.

Eleven buildings with 60,000 square feet of floor space are provided for the use of the student body in the school. These include a dormitory which contains a lounge for the use of the students and 200 bedrooms. Across from the dormitory is located the airport cafeteria where instructors and students are served. Students are received and student pilots receive ground school instruction at the administration building. Adjacent to this building is the shop where students complete the ground school course which includes practical work on airplanes. In the hangars nearby are kept reserve planes which are put into use when the regular planes of the training fleet are in the shop for repairs.

Beyond the hangars is located the factory of Parks Aircraft, Inc. Parks students are taken through this plant periodically to acquaint them with airplane factory production methods. The new school of airplane and engine mechanics is located beside the factory.

New students are met at the St. Louis railroad terminal by a Parks Air College automobile and driven to the airport. The first day is spent in enrolling in the school and selecting quarters. The personnel officer also arranges for the immediate examination of a new student by the Department of Commerce flight surgeon. These tests are given at St. Louis on the evening of the first day the student arrives.

Instruction begins the following day when the student is taken for his first flight, and he is allowed to handle the controls under the supervision of the instructor while in the air. The primary flying course requires twenty hours in the air by which time the student usually has had several hours of solo flying to his credit. This course includes instruction in straight and level flying, turns, take-offs, landings, spins, banks and spirals. The advanced flying course includes a review of the primary course and instruction in side slips, wing overs, turns and landings. In the transport pilot's course instruction is given in cross-country flying, acrobatics, night flying, including ten hours of solo over lighted airways, and ten hours of solo cabin plane flying. .

Subjects taught in the pilot's ground school course include, meteorology, navigation, air law, aircraft engines, instruments, Department of Commerce regulations, aerodynamics parachutes and radio.

The training fleet includes new production airplanes powered with both air and water-cooled engines. Thirty-two instructors are employed.

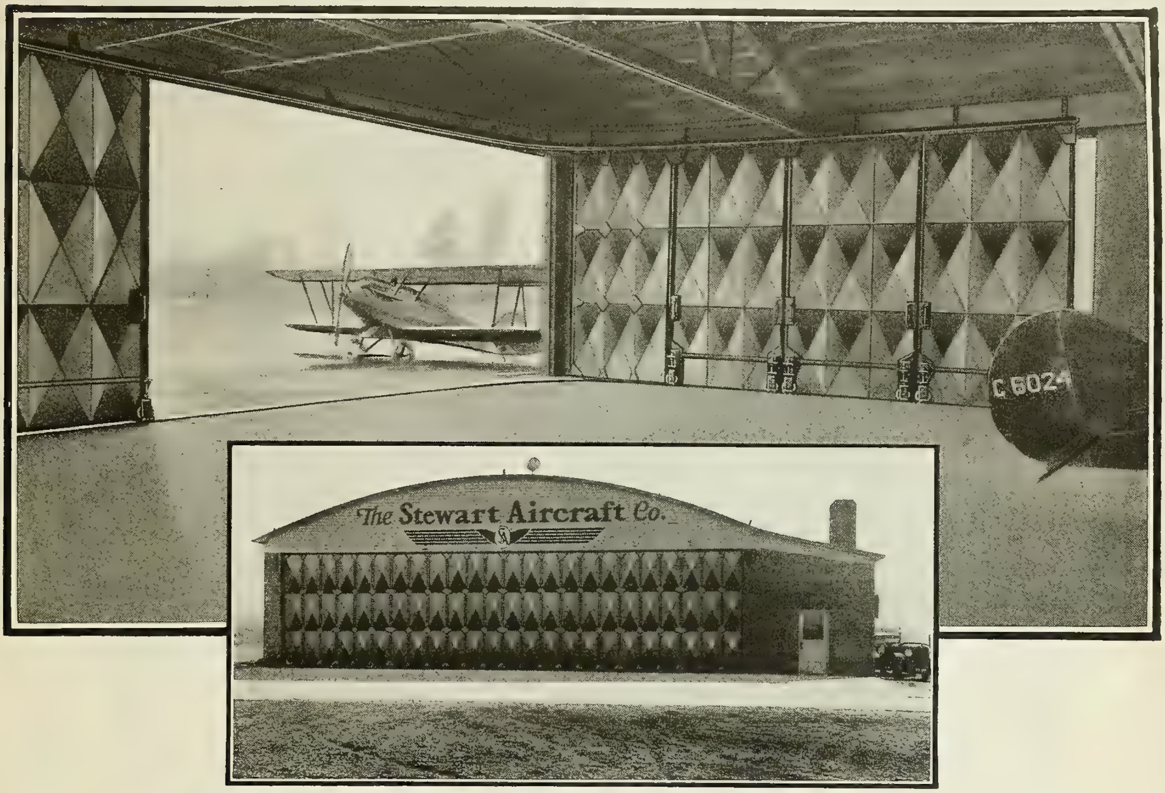
ST. LOUIS

[A. W. LEAGUE]

TENTATIVE plans for a $75,000 addition to the plant of the Ryan Aircraft Corporation at the St. Louis Municipal Airport, to provide for an increased production of Ryan brougham planes and the manufacture of Parks' planes, are awaiting the approval of executives of the Detroit Aircraft Corporation of which the Ryan and Parks companies are subsidiaries. The Parks manufacturing operations, consisting chiefly of the construction of training ships, will probably be moved to the St. Louis Municipal Airport as soon as the Ryan plant increases its facilities. Parks planes were produced originally at the Parks Airport, south of East St. Louis.

A STEADY increase in the number of passengers carried between St. Louis and Tulsa, Okla., is shown in a report made public by M. P. Bickley, St. Louis traffic manager of the Southwest Air Fast Express, which discloses that since April, the first full month of operation when 225 passengers were carried, the figure increased to 1,600 during the month of October. The

(Continued on next page)



There's an R-W Way for *every* doorway

The hangar of the Stewart Aircraft Company at the Cleveland Municipal Airport has a storage capacity of 10 planes. The doorway of the hangar is 56 ft. wide by 13 ft. 9 in. high.

When Richards-Wilcox engineers were called in to solve the doorway problem for this large opening, they installed 8 all-steel doors. They operate on curved floor rails which permit the doors to slide back to either side, allowing a full width unobstructed opening without center posts.

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(*Missouri News continued*)

company, which operates a fleet of ten trimotored Fords over the St. Louis-Tulsa route, in its report shows that in May 408 passengers were carried; June, 631; July, 961; August, 1,289; September, 1,171; and October, 1,600. The decrease in September as compared to the figure for August was attributed by company officials to rainy weather.

ST. LOUIS has been selected by the United States Weather Bureau as one of the fourteen points in the United States from which studies of the upper air conditions will be made for the guidance of commercial aviation. A series of small balloons bearing a meteorograph to record pressure, temperature, humidity and other atmospheric conditions, will be sent into the air in an effort to determine conditions eight miles above the earth. The meteorograph will be placed in a wicker basket and a parachute will be attached to bear it to earth after the balloon bursts from expansion under the lightened pressure of the higher atmosphere. The balloons will carry no passengers. They will be inflated to a diameter of five feet and will be sent aloft at six-hour intervals on days when high and low pressure areas prevail. R. C. Schmidt, manager of the weather station at the St. Louis Municipal Airport, will be in charge of the tests.

A SECOND helium gas tank for use in the inflation of dirigibles has been completed at Scott Field near St. Louis at a cost of $49,000 according to Lieutenant-Colonel Paegelow, commandant of the field. The new gas tank has a capacity of 300,000 cubic feet as compared with 500,000 cubic feet for the other tank.

THE St. Louis Board of Estimate and Apportionment has approved the lease of two acres of ground at the Municipal Airport to the Department of Commerce for the erection of a Government airway radio range station. The Government will pay the city twenty dollars a month for the ground, which is on the east side of the field.

A POWERHOUSE and a water tank of 200,000 gallons capacity have been completed at the Curtiss-Robertson Airplane Manufacturing Company at the St. Louis Municipal Airport. The new construction represents an investment of $300,000. The powerhouse equipment will include apparatus for making the gas used in welding in the manufacture of airplanes. The water tank is being built as a reserve for the fire sprinkler recently installed in the factory.

TEN Thrush monoplanes to be used in air mail and passenger service in China are nearing completion at the Curtiss-Robertson factory. The planes are scheduled for shipment during January and will be used on a 3,000-mile route planned by Major Robertson while in China early in 1929. Five additional planes will be sent to China later. Three Thrush monoplanes and two Robins have been built for a flying school to be operated at Havana, Cuba, by the Curtiss-Wright Flying Service.

A PLAN to aid flying students lacking funds, has been announced by W. B. Haviland, director of Universal Aviation Schools. Through a coöperative arrangement the Morris Plan Banks offer to extend all or part of the money required for flying courses to young men of good reputation and with two financially responsible sponsors. A portion of the loan is to be repaid each month together with part of the interest based on the face value of the loan. Application can be made to any of the 150 Morris Plan Banks throughout the country. Universal Schools recently announced free life and disability insurance to the amount of $2,500 to all students during the period of their training, without charge.

A SPECIAL course for private pilots has been announced by Parks Air College to supplement its courses for Limited Commercial and Transport courses. It will include the Transport Pilot's ground school course and twenty-eight hours of flying—ten more than are required by the United States Department of Commerce for such a license.

A Ford trimotor monoplane has been added to the training fleet of Parks Air College and will be used exclusively for student instruction. The Ford is powered with three Pratt and Whitney Wasp engines of 425 horsepower each. It is capable of a high speed of 140 miles per hour and cruises at 115 miles per hour. Its equipment includes reclining chairs for fifteen passengers, seats for two pilots, and a lavatory and lounge. Under a new training plan worked out by Oliver L. Parks, vice-president and general manager of the St. Louis institution, every transport student will receive enough dual instruction in the ship to qualify him for five hours of solo flying which will serve to complete his 200 hours of flying instruction.

The Parks P-2-A, a three-place open biplane powered with a Whirlwind engine 165 horsepower, has received its Approved Type Certificate from the Department of Commerce, being the third Parks plane to be so approved. The new plane is designed for sport, training and cross-country flying. It has a high speed of 126 miles per hour and a landing speed of forty-five miles per hour.

VISITORS to the St. Louis Municipal Airport are profuse in their praise of the improvements brought about by the various operating concerns on the field and by the city administration. The modern steam-heated brick and steel hangars, the runways, factories, the 1,500-foot concrete apron with its chain safety fence, the improved lighting system, comfort station, fire prevention equipment and other improvements developed within the last two years elicit expressions of wonder from persons who have remained away during the period of recent development. The grading and other preparation on the east side of the landing field is nearing completion and Cold Water Creek, which formerly flooded a portion of the landing area following heavy rains, is to be filled. The deeper diversion channel around the field is ready for use and the water has been turned into it. Drainage pipe will be laid in the old creek bed, which will be filled with crushed rock, and covered with earth.

THREE new combination Stearman mail and passenger planes, powered with 525-horsepower Pratt and Whitney Hornet engines, have been added to the equipment of the Inter-State Airlines operating the St. Louis-Evansville air mail route. The ships have a capacity of four passengers, pilot and 1,200 pounds of mail.

MISSOURI now has nineteen established airports, one to every 3,620 square miles in the state. These ports are located at St. Louis, Jefferson City, Kansas City, St. Joseph, Sedalia, Springfield, Joplin, Kirksville, Boonville, Unionville, Marshall, Queen City, Memphis, Richland, Bucklin, Columbia, Carthage, Brookfield and Warrenton. Nine of the fields are owned by municipalities, six by commercial organizations and six are auxiliary. Six are illuminated, making night landings possible. In addition there are numerous emergency landing fields which do not have service or an attendant during the day.

TRAIN-PLANE service between Chicago, St. Louis and New Orleans will be started in the near future by the Illinois Central Railroad and Continental Air Service Inc. Southbound passengers will leave Chicago or St. Louis by train, transferring to amphibion planes at Memphis, Tennessee, for a flight to Vicksburg or New Orleans. Northbound schedules call for rail travel from New Orleans to Memphis, then by air to St. Louis and Chicago. Travel Air landplanes are to be used on the northern section of the route and Loening amphibions on the southern section.

THE Ryan Aircraft Corporation has established a flat rate for repair and service operations on Ryan planes. By this practice owners of Ryan planes may learn in advance the cost of recovering their ship, replacing control cables, renewing streamlining and other service work. The system is similar to the schedule of set charges established in the automobile industry.

ANGLUM, Missouri, the postoffice address of the St. Louis Municipal Airport, has been officially changed to Robertson, Missouri. The change in the name of Anglum is in recognition of the services of Maj. Wm. B. Robertson and his brothers Frank H. and Dan, who were among the first commercial pilots to operate from the field.

THE Curtiss-Wright Flying Service has established a supply depot for the distribution of aernautical equipment in St. Louis. A total of 300 manufacturers of aircraft parts will be represented in the stocks maintained. The warehouse located in St. Louis is the first of a chain of such depots

(*Continued on next page*)

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(*Missouri News continued*)

to be located throughout the United States. According to officials of the Curtiss-Wright company, St. Louis has been selected as depot headquarters because of its central location and transportation facilities. W. W. Barry, purchasing agent for the company, is supervising the establishment of a retail store to be operated in conjunction with the warehouse.

WILLIAM A. LAMKEY was recently appointed permanent factory inspector for the Department of Commerce at the factory of the Nicholas-Beazley Airplane Co., Inc., of Marshall, Mo., manufacturers of the Barling NB-3 plane.

CAPT. WILLIAM B. WIMER has been appointed to the instructors' staff of the Curtiss-Wright Flying Service at the Curtiss-Steinberg Airport, south of East St. Louis. Capt. Wimer is a member of the 45th Division Air Service of the Missouri National Guard.

PLANS for the establishment of dealers for Ryan planes in every town and city in the United States are being made, according to a new policy announced by the Ryan Aircraft division of the Detroit Aircraft Corporation.

Sales agencies will be established in every town with 10,000 population or over by the company's officials who are now touring the country. Preference will be given to organizations capable of giving service on the ships, and who will employ full time airplane salesmen, according to John C. Nulsen, general manager of the Ryan Aircraft Corporation. Many automobile companies have already been given sales franchises for the Ryan Brougham and more of these organizations will be taken into the sales organization. The contracts will provide also for the sale of the Lockheed-Vega, Parks planes, the Eastman flying boat and other ships made by the subsidiaries of the Detroit Aircraft Corporation, the announcement stated.

In the larger cities the sales agencies will keep a demonstrator available, together with one or more ships for immediate delivery, according to the plan. In the smaller towns, a factory demonstrator will be placed on exhibition periodically, and made available to the local dealer for demonstrations. All these agencies will be authorized to sell planes on the time payment plan, and will provide hangar facilities and service arrangements. The plan calls for the immediate appointment of 100 airplane dealers and later additions to this staff.

PLANS were concluded recently by the St. Louis Glider Club to erect a hangar at the club's field located at Creve Coeur Lake. The club is headed by Harry Kuchins, president of the Kuchins Furniture Manufacturing Company. It also was decided to construct sailplanes and a hydroglider. They will be built by students of the St. Louis Universal Flying School and the glider club's members. Other glider clubs will be organized in St. Louis by the club for competitive contests. Material has been received at the Universal school for constructing additional training gliders. Several contests already have been held at the club's field.

Frank R. Schwartz, a flying member of the St. Louis police force

PARKS AIR COLLEGE of East St. Louis recently purchased two gliders from Gliders, Inc., of Orion, Mich. The gliders will be used for experimental purposes and will be flown by members of the instruction staff of Parks Air College.

JOHN D. LEWIS has been appointed general manager of the Braniff Division of Universal Aviation Corporation to succeed Paul Braniff, who recently resigned. Universal's Braniff Division operates daily passenger lines between Tulsa, Oklahoma City, Wichita Falls, Fort Worth and Dallas. Mr. Lewis' headquarters will be at Tulsa, Oklahoma, where Universal recently erected a hangar.

BOB BAUMAN has been appointed factory sales representative for the southwestern section of the United States by the Ryan Aircraft Corporation of Robertson, Mo., a division of the Detroit Aircraft Corporation.

Universal Flying School at Lambert-St. Louis Field

THE Universal Flying School, formerly known as the Robertson Flying School, is located at Lambert-St. Louis Field, St. Louis, Mo. The school was licensed by the Department of Commerce on August 19, 1929, to give ground and flight courses leading to private, limited commercial and transport pilots' licenses.

There is much activity at the Lambert-St. Louis Field where sightseeing planes are operated and air mail planes and Transcontinental Air Transport planes arrive and take-off. The factory of the Ryan Aircraft Corporation is situated one block from the field and the Curtiss-Robin plant is located nearby. Universal students are taken on inspection trips through the Ryan and Curtiss-Robin factories as part of the course of instruction.

The lecture rooms of the Universal school are located in a brick structure which overlooks Lambert-St. Louis Field. A hangar adjacent to this building houses the school's training planes. Shop instruction which is included in the ground school courses is given in a building which was recently constructed near the hangar. A ground school is also maintained in downtown St. Louis where courses in aviation business and aviation mechanics are conducted for the benefit of students who are employed. Night instruction may be had at this school.

The private pilot's course includes ten hours of dual flying and ten hours of solo. No student is permitted to solo until he has been instructed in stalls and spins. This course requires from five to eight weeks to complete. The limited commercial pilot's course gives 20 hours of dual flying and 30 hours of solo. Students are drilled in approaches, landings, take-offs, turns, cross-country flights and acrobatics, and approximately twelve weeks are required to complete the course. Two hundred hours are required to complete the transport pilot's course. Training consists of the general schedule followed in the limited commercial course in addition to instruction in cabin plane flying, and blind and night flying. A plane is supplied to transport graduates for taking the examination given by the Department of Commerce for transport licenses.

A special pilot's ground course is included in the Universal flight course and includes the same subjects given in the day mechanic's course with the addition of navigation, meteorology, air commerce regulations and aerodynamics.

The Lambert-St. Louis school is under the supervision of the Universal Aviation Corporation, a division of Aviation Corporation. Lieut.-Comdr. Haviland, formerly of the United States Navy, is director of the Universal Aviation Schools.

THE Aviation Corporation has appointed J. F. Hamilton, president of the New York State Railways, Schenectady Railway and the United Traction Company, to the presidency of a corporation which will be formed by the Aviation Corporation in a program of consolidation of the air transport companies which are subsidiaries of the corporation. The name of the new corporation was not announced.

The corporation which Mr. Hamilton will head, his appointment being effective January 1, will be a subsidiary of the Aviation Corporation under which the air transport systems controlled by the Aviation Corporation will be consolidated. The subsidiaries of the Aviation Corporation which will be supervised by the new corporation are as follows: Colonial Airways Corporation; Universal Aviation Corporation; Southern Air Transport, Inc.; Interstate Airlines, Inc.; and Embry-Riddle Aviation Corporation.

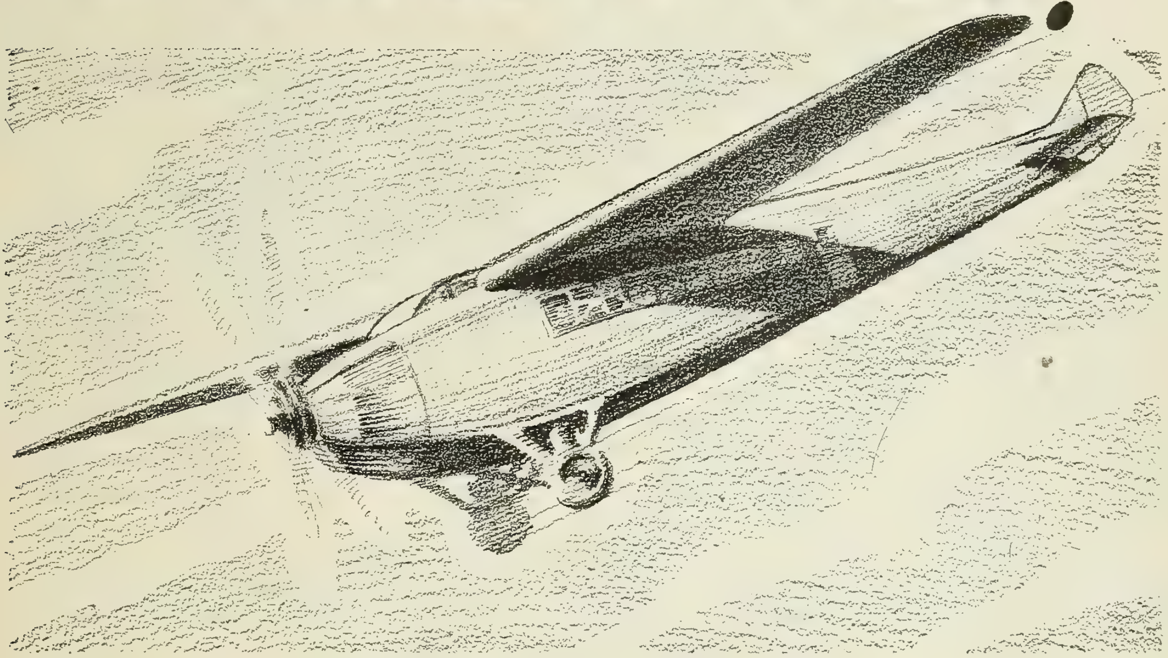
KANSAS CITY

[H. H. JAMES]

THE annual conference of the Aeronautics Division, Department of Commerce, heretofore always held in Washington, D. C., will be held this year in Kansas City. Announcement of this change was made by

(*Continued on next page*)

Endurance!



...depends largely on structure

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NATIONAL-SHELBY
AIRCRAFT TUBING

(Missouri News continued)

Richard H. Lees, Jr., supervising inspector of civilian aeronautics for the Kansas City district. The sessions will be held in the assembly room of the Chamber of Commerce. Major Clarence M. Young, Assistant Secretary of Commerce in charge of aeronautics, will preside at the sessions. The conference formulates the rules for civilian flying and discusses the problems and development of aviation in general.

THE Art Goebel Flying School of Kansas City has leased a tract of 160 acres one mile north of the Courtney Bridge across the Missouri River, near Liberty, Mo., as an auxiliary training field. The field will also serve as a municipal field for Liberty, Mo. The field is eight miles from the Kansas City Municipal Airport where the Goebel School is located.

THE Rearwin Airplanes, Inc., maker of the Ken-Royce planes and the Inland Aviation Corporation, maker of the Inland Sport monoplane, have leased the building at Fairfax Airport erected by the National Air Industries. While the two concerns will carry on manufacturing activities under the same roof they will be connected in no way, each concern maintaining its own organization.

THE Curtiss Flying Service at Kansas City has established a special ground course in aeronautics, designed to give business men a working knowledge of aviation and the problems of pilots. The first course will be twenty-six lectures over a period of thirteen weeks by Lieut. Myron F. Eddy, U. S. N., retired.

CURTISS FLYING SERVICE at Kansas City is to expand its activities, according to E. M. Oxley, sales manager. The service, as expanded, will include aerial photography, selling of planes, airport lighting equipment, the servicing and repairing of all makes of planes, air transportation and the flying school.

THE Air Corps Reserve Officers' Association recently elected Lieut. Wofford Lew president for the coming year. Lieut. Roy C. Farrell, manager of the Kansas City Municipal Airport, was elected vice-president, Lieut. Alfred D. Hillman, secretary, and Lieut. Ben Sweeney, treasurer.

THE Schlee-Brock Aircraft Corporation of Detroit, Mich., has been appointed distributor for the Inland Aviation Company of Kansas City, Mo., and will distribute the Inland Sport monoplane in Michigan, Indiana, Illinois, Wisconsin, and Minnesota.

Production of the Inland monoplane is under way at the Inland Aviation Company's new factory at Fairfax Airport, Kansas City, according to Lieut. Willfred G. Moore, sales director of the company. The Inland Sport is the monoplane in which Lieut. Moore recently established a world's speed and the American altitude record for light planes. The Inland Sport monoplane is a high-wing, open-cockpit two-place ship with a side by side seating arrangement, and is powered with a LeBlond 60 or Warner Scarab engine.

THE Aeronautics Branch of the Department of Commerce will begin the installation of a radio beacon system at the Kansas City Airport shortly after the first of the year, according to a recent announcement of department officials. In addition to the installation of a radio beacon system at Kansas City, the Department also plans the installation of similar beacons at Lambert-St. Louis Field, and at Ft. Crook, Omaha, Nebraska. The beacons will be installed to facilitate the movement of mail and passenger planes in foggy weather.

TRUXAL and Hightower of Kansas City, Mo., have completed arrangements with the Davis Aircraft Corporation of Richmond, Ind., for the distribution of monoplanes manufactured by the Davis company. Truxal and Hightower were recently appointed dealers for the Davis corporation and will distribute the Davis monoplane in the Kansas City territory. The Davis monoplane is manufactured by the Davis Aircraft Corporation under an Approved Type Certificate issued for a LeBlond engine of 60 horsepower, or a Kinner 100-horsepower engine. Powered with the LeBlond engine, the ship has a ceiling of 10,000 feet, a high speed of 95 miles per hour and a landing speed of 38 miles per hour. Powered with the Kinner 100-horsepower engine, it has a ceiling of 12,000 feet, a high speed of 130 miles per hour, and a landing speed of 40 miles per hour.

OKLAHOMA

[C. M. Cole]

PAUL BRANIFF, who recently resigned as vice-president of Braniff Air Lines, Inc., subsidiary of the Universal Aviation Corporation, has announced the prospective organization of a new airline to operate between Oklahoma City, Kansas City and Dallas. The company is expected to begin service March 1. The company will operate as the Paul Braniff Lines and will provide service for Kansas City, Wichita, Kans., Tulsa, Oklahoma City, Wichita Falls, Forth Worth and Dallas.

A 400-ACRE tract of land has been acquired at Bartlesville, Okla., by the Empire Gas and Fuel company for a private aviation field. The field will be equipped with four-way runways and a steel and brick hangar.

THE Garland School of Aeronautics has been made a licensed transport school with the highest possible official rating, according to R. F. Garland, president. This is the second Tulsa flying school that has received Department of Commerce approval. O. M. Bounds is general manager of the Garland activities, which include school operation at Tulsa and Okmulkee, Okla., with forty students enrolled in the former and fifteen in the latter. Art Mills is chief flying instructor.

A MOVEMENT has been started toward the organization of a glider club in Oklahoma City, backed by Arch Dixon, Harvey P. Everest, Virgil Brown, Clarence Page and H. C. Martin. Gliding will be done from the municipal airport pending completion of other arrangements, according to plans of the group.

W. L. RUSH, mayor of Miami, Okla., has appointed a committee of five men to assist in outlining plans for a modern airport. George Stein, mining engineer, was appointed chairman. It is planned to build a $100,000 airport.

LOUISIANA

[C. F. Cock]

AS a result of the steady increase in travel by air in Louisiana two commercial aviation companies operating in the state are making expansions in their services to meet the new requirements. Both the Delta Air Service, Inc., of Monroe, La., and the Weddell-Williams Air Service, Inc., of New Orleans, are establishing more frequent schedules and the latter company has purchased the field and equipment of Shreveport Airways, at Shreveport, La., to enlarge its facilities for 1930 traffic.

The Weddell-Williams organization, which has been operating a semi-weekly passenger service from New Orleans to Shreveport, recently began a daily service, and on January 1 was scheduled to begin a service of two planes a day on this route, one plane leaving New Orleans and another leaving Shreveport and each making a round trip.

The Delta Air Service, Inc., operating from Birmingham, Ala., and Jackson, Miss., to Dallas, Texas, by way of Monroe and Shreveport, will shortly establish a daily service on its line.

THE Adjustable Wing Aircraft Company plans to begin the manufacture of planes in the near future, according to J. C. Bankston of Shreveport, president of the company and originator of the patented adjustable wing device. The adjustable wing plane is designed to give a low landing speed by shifting the angle of incidence as the plane descends. This is done by controls operated by the pilot.

Organization work is now under way and is scheduled to be completed early in 1930, Bankston said. Officials of the concern other than Mr. Bankston are Dr. A. A. Herold, vice president; Hazel D. Koch, secretary-treasurer; Frank Blanchard, general counsel; and L. E. Graves, consulting engineers. C. B. Williams and T. B. Herndon are directors.

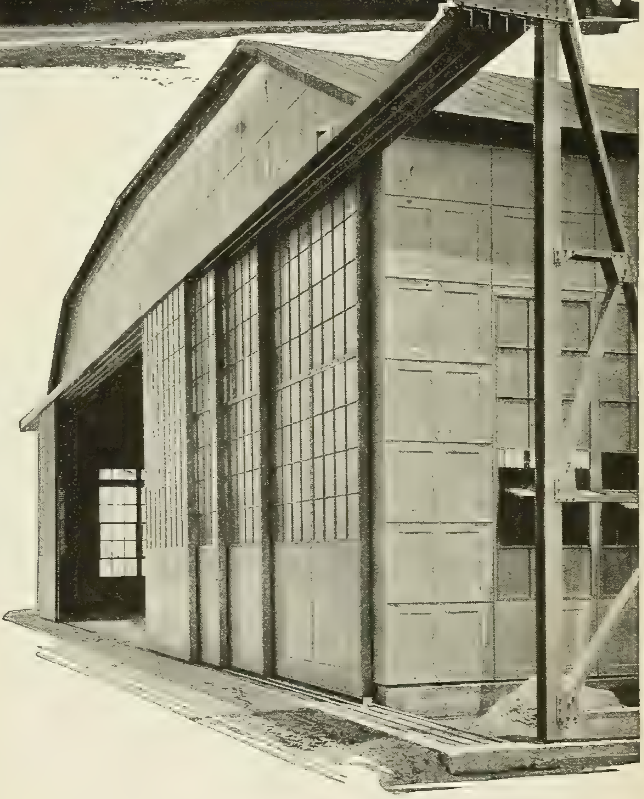
THE transfer of approximately 22,000 acres of land in Bossier Parish, near Shreveport, La., to the Federal Government for use as a base for the Third Attack Wing of the Army Air Corps was to be completed January 1 by the city of Shreveport.

For the purchase of the tract the city voted a bond issue of $1,500,000. This issue, together with an issue of $300,000 for a

(Continued on next page)

STANDARDIZED HANGARS

Truscon Standardized Hangar, Type 1-S, with Truscon Steel Hangar Doors for Lee Motor Company, Collegeville, Pa.



Truscon Steel Hangar Doors, Straight Slide Type, and Truscon Standardized Hangars for Standard Oil Company, Municipal Airport, Memphis, Tenn.

Truscon has specialized in housing for aeronautical requirements. Truscon Standardized Hangars—furnished in sizes and types for individual requirements—provide clear floor space, thorough fire protection and ample daylight. These permanent hangars can be readily enlarged or re-erected in a new location without loss.

Truscon Steel Hangar Doors are strong, durable and fireproof, operate easily and open the full width of the hangar. They are available in Straight or Curved Track Types and in all sizes. Truscon also furnishes Steel Windows, Steeldeck Roofs and other Permanent Building Products for hangar construction.

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STEEL HANGAR DOORS

(Louisiana News continued)

municipal airport, was sold on November 22 at a combined price of $1,848,942. A local committee is scheduled to confer with officials to hasten the establishment of the field.

A tentative site for the municipal airport has been selected and arrangements for obtaining possession are under way.

THE city of Alexandria, La., which is now developing a municipal airport containing 265 acres, will shortly advertise for bids for equipment. All-steel hangars will be erected.

THE completion of the $150,000 expansion program of Menefee Field, the St. Bernard Parish airport just below New Orleans, was celebrated recently by a two-day air carnival. Twenty-six planes from airports throughout the South and West entered into the celebration, with Admiral A. W. Marshall, of the U. S. Navy, heading the squadron of fighting planes from Pensacola, and Captain E. B. Stewart in command of the Fort Crockett training and observation ships. A. P. Barrett, president of the Southern Air Transport, was one of the guests of honor. A dinner was given afterwards to the participating aviators by representatives of the city government and members of civic organizations.

The Southern Air Transport, which recently completed a $150,000 expansion program at Menefee Field, is now installing all necessary equipment for night flying. The cost of light installation is estimated at $20,000. The completed lighting system will rank the St. Bernard airport as a first-class airport.

TEXAS

[RUBYE THOMPSON]

FOLLOWING a recent inspection of the landing field at Grand Saline, Texas, by officials of the Delta Air Service, Inc., operators of the Dallas-Birmingham passenger service, announcement was made that Grand Saline has been made a flag stop for planes flying between Dallas and Birmingham.

The eastbound plane leaving Dallas at 8:30 each morning arrives at Grand Saline at 9:15 a.m. and the afternoon plane from Shreveport will reach the field at 3:15.

A CURTISS CARRIER PIGEON II is being tested by the National Air Transport, according to Charles B. Braum, Dallas manager of the organization. The plane carries a payload of 2,000 pounds at a high speed of 149 miles per hour. It is powered with a Curtiss Conqueror engine of 625 horsepower. The fireproof cargo compartment is constructed entirely of metal and has a capacity of 125 cubic feet.

WORK of grading for the runways on the Tyler, Texas, municipal airport five miles west of Tyler on the Dixie highway, is in progress, and bids have been received for the erection of a hangar. Workmen are busy grading the field for landing areas. The hangar will cost approximately $12,000, will be 100 by 100 feet and will be so constructed as to be able to house the thirty-two passenger transport planes which Western Air Transport and Universal Air Lines plan to use on their combined projected transcontinental airline.

A lean-to, 12 by 100 feet, will be built on one side of the hangar to house the offices, rest room and shops. A concrete floor will be laid for the entire building. The field's longest runway is 4,500 feet, or 2,000 feet longer than the Government requires, and with grading work on the field being done in accordance with the Department of Commerce regulations, an A1 classification rating is expected.

PRELIMINARY to flood relief measures, the Government recently contracted with the Southwestern Aerial Surveys for the photographing and mapping of 4,700 square miles of the Mississippi and Red River valleys. Southwestern Aerial Surveys is a division of Southern Air Transport, a subsidiary of the Aviation Corporation.

Designation of the Southern Air Transport division of the Aviation Corporation as dealers for planes manufactured by the Fairchild Airplane Manufacturing Corporation in the five states covered by the S. A. T. system was announced recently by Hugh L. Smith, general sales manager of S. A. T. The distribution of Fairchild planes was formerly handled by the Fairchild Aerial Surveys at Dallas. The distributorship covers Texas, Louisiana, Alabama, Mississippi, and Georgia.

E. G. (Swede) Rhenstrom, chief of the technical staff of the Southern Air Transport, Inc., has been promoted to the operations department of the Aviation Corporation, of which S. A. T. is a division, according to a recent announcement. Mr. Rhenstrom was formerly operations manager of the S. A. T., directing flying operations from Atlanta to the Rio Grande. As chief of the technical staff, he developed a system of logs, forms and records that has been adopted by the Aviation Corporation as the simplest and most adequate yet devised.

JERRY MARSHALL has been appointed operation manager of the Southern Air Transport, Inc., a division of the Aviation Corporation. Mr. Marshall was formerly division manager of S. A. T. at New Orleans, and he is succeeded there by W. K. Ennis, formerly airport sales manager of the company.

Mr. Marshall, one of the first four air mail pilots in Texas, attended the University of Texas where he organized and operated the University School of Aeronautics.

AMERICAN tourists are now being offered excursion tickets at reduced fares to Mexico City from Brownsville and return. The tickets include transportation both ways, hotel and restaurant service, and automobile tours. The tours include a three-hour sight-seeing tour of Mexico City, a seven-hour tour to Villa de Guadalupe shrine and the San Juan de Teotihuncan pyramids, a five-hour tour to the Desierto de los Leones, a five-hour tour to the Xochimilco floating gardens, and other excursions. English-speaking guides will be with all parties. Planes carrying the tourists leave Brownsville at 8:15 a. m. and arrive at Mexico City at 1:45 p. m.

SAN ANTONIO

[MABEL COOPER]

FOUR Army Air Corps planes left Kelly Field December 7th for Mexico City, via Brownsville, Matamoros, and Tampico, to represent the U. S. Army Air Corps during the Mexican Aviation Week, December 10-14. The flight commander was Major C. L. Tinker, director of training at Kelly Field who flew a pursuit plane. A bomber from Langley Field was piloted by Lieutenants Marvin Burnside and Marion Huggins. Lieutenant Julius Fleck piloted an attack ship of the 3rd Attack Group from Ft. Crockett, Texas, and an observation ship completed the detachment.

A NINETY-ACRE tract of the Odem estate east of Sinton, Texas, has been approved as an emergency landing field by the Department of Commerce, Aeronautics Branch, and leased for five years by the Government. Sinton is near the Gulf Coast between Corpus Christi and Houston. The field will be equipped with a 2,000,000-candlepower beacon, and border lights will be installed. The field is on the air mail route connecting Brownsville, and New Orleans, via Corpus Christi and Houston.

AN endurance test is being conducted at Kelly Field on the beacon installed at the airport six months ago. The beacon is being operated every night for a month to determine its endurance. The light is revolved by an electric motor and is equipped with several bulbs designed to interchange automatically when a bulb burns out. It is desired to ascertain beyond question whether or not the motor will run continuously.

AUSTIN

[CLAIRE MORRIS]

THE Texas Fire Insurance Company recently announced a reduction of twenty-five per cent thoroughout Texas on fire insurance rates on brick airplane hangars and their contents. This action of the department was due to the favorable experience with this class of building.

THE University Aerial Service Corporation of Austin, the agent for Waco airplanes in Texas, has on display in Austin every current type of plane built by the Waco Company. A recent carload shipment of planes from the factory made the display complete.

THIRTY-NINE students are registered for the degree of bachelor of science in aeronautical engineering at the University of Texas at Austin. Five courses are being offered. Aeronautical laboratories for the work are located in the recently completed Engineering Building.

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THE HIGHEST PRICED BEARING IN THE WORLD

THE JUNIOR AUTOGIRO

A MINIATURE VERSION OF THE FAMOUS "FLYING WINDMILL"

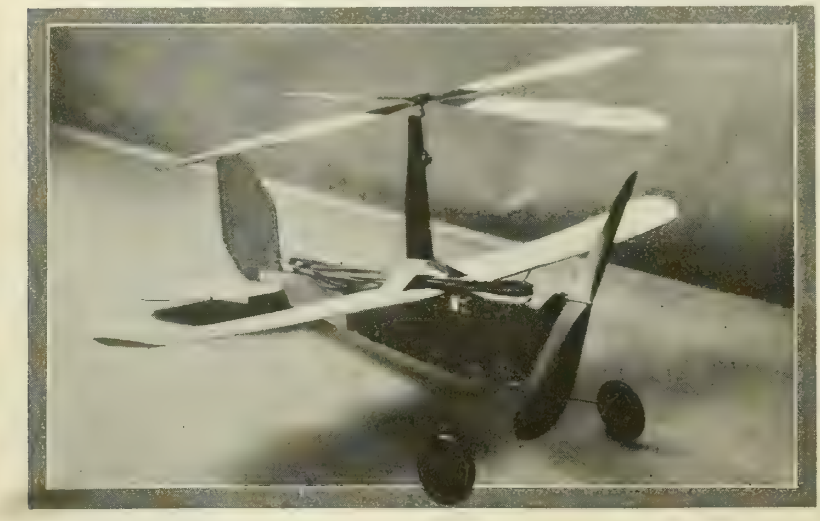
By R. E. Dowd

IN the December Junior Activities section we learned how to make a simple boomerang. This was done to become familiar with the operation and theory of the boomerang so that this month we could study and build an actual flying model of the autogiro. As you probably know, the autogiro is one of the most remarkable developments in the class of heavier-than-air flying machines It is revolutionary because it can climb steeply and descend almost vertically. The heavier-than-air class of flying machines includes the following: glider, airplane (powerdriven), orinthopter, helicopter, helicogyre, and lastly the autogiro, which represents the development of Senor de la Cierva, a brilliant Spanish inventor. Mr. de la Cierva tells us that his first successful demonstrations of the autogiro principle were made with small flying models, a wonderful tribute to the possibilities of model experimenting.

Let's see if we can define each type of machine. First, we have the glider. This is simple; we have already studied two types in models and all the modern designs in large machines in our Junior Activities section. Second, the airplane, which is the type we know so well. Many of us have flown in airplanes, which after all are only powerdriven gliders. Third, the ornithopter, or flapping wing machine, which is patterned after the birds. To date, ornithopters are purely experimental types which have flown only as models. Fourth, the helicopter, or direct lift machine in which one or more propellers mounted on vertical axes lift the load directly This type is also in the experimental stage, although men have actually been lifted into the air in such machines. Fifth, the helicogyre, also an experimental type, which operates on the principle of a helicopter, the propellers taking the form of large wings driven by small engines at their tips. Sixth, the autogiro, the object of our study.

Study the Drawings

Now take a good look at the drawings. Don't be discouraged, boys, because they seem so complicated. In order to save space we have crowded quite a bit into our drawings, but if you will just follow the description along step by step you'll soon have the whole idea. After all, that's what we are trying to do in our department. We are trying to study out new principles and designs in a simple manner so that every reader will understand them and will be better fitted as years go on to assist in developing the science of mechanical flight.


The completed Junior Autogiro designed and built by R. E. Dowd

Of course, we want to have some fun too, and we're pretty sure of that. We would almost be willing to wager that there have been many boomerangs made after last month's plans that have given their builders lots of fun. Boomerangs have a way of reappearing from unknown directions and clipping the thrower in the ear. Since our boomerang story went to press we had a remarkable flight of over 600 feet distance, with a duration of over a minute A plane with engine idling nearby may have assisted, but it surely was wonderful.

Well, now let's turn to the autogiro. Our drawing shows three views of the model to scale. At first glance the design seems much like a regular plane except for the big "windmill" on top. That's just what it is in reality for it has fuselage, propeller, stabilizer, elevators, fin, rudder, wings, and landing gear. Perhaps, it isn't so complicated after all!

We should first get this point fixed in mind. The rotor *turns* but is *not* mechanically driven like the propeller. Right there is where we get the "auto" part of the name autogiro. The rotor is self-propelling from the moving air just as the sailboat or windmill. The principle is called autorotation as we shall later learn.

After checking over the three views we will have a complete mental picture of the machine and we are ready to run through a short analysis of the operation of the machine.

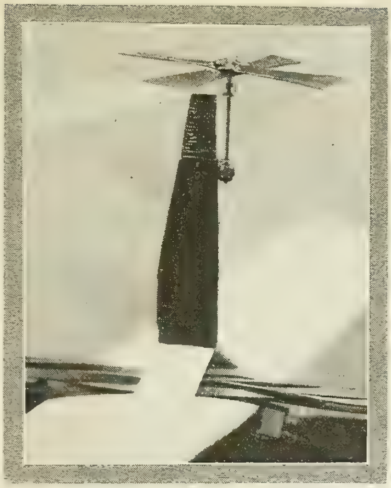
Some Basic Theories

Figure 1 shows the rotor circle, which might be at this step either boomerang or autogiro. FP is the direction of the flight path. The arrow indicates the direction of rotation, which is clockwise viewed from above. The shaded portion of the circle (A) indicates the area in which the blades are advancing into the oncoming air, while in the other portion (B) the blades are retreating from the same air. Of course section A lifts more than B. With that picture in mind, we can turn to figure 2.

Here again we have two segments of the rotor circle marked A and B. In this case they embrace 90 degrees each, and incidentally, the blade velocity through the air in these segments is at the two extremes. Again A represents the greater velocity; also the absolute maximum and minimum speeds are to be found on the horizontal center lines. Now, if the blade tip speed of the rotor is one and one-half times the forward speed of the whole machine, as is common in the full size autogiro, we can easily understand that every point along the blade length is moving at a different air speed. Indeed, in the B segment some points are moving backward.

The next step is shown in figure 3. Here we have the same segments A and B but we have added a tractor propeller. Naturally, if A lifts more than B the center of lift of the rotor must be in the A segment as indicated by LR (lift rotor). If our propeller turns as shown with the left hand blade coming up over the top of the circle, the propeller torque will tend to depress the A segment and lift the B segment. In other words these forces will *oppose* one another. This tends to stabilize the flight. But there are other forces to consider. Figure 4 is a diagram of the rotor with C_1, C_2, C_3, and C_4, representing centrifugal forces applied to each blade. Don't let that word scare you boys. When you swing your school books around on a strap or twirl a horse chestnut on a string, you have examples of centrifugal force. It is simply a tendency to pull out away from the center.

Figure 5 shows the side view of the rotor, and centrifugal forces C_1 and C_3 are indicated, as well as LR the lift from the rotor. Notice that this lift tends to bend the rotor blades upward, while the forces C_1 and C_3 tend to straighten the blades out flat. What an interesting little battle of forces, lift versus centrifugal force. If we carry the battle comparison a little further, we have the next step; for just as the opposing armies gain and lose ground, so does our rotor yield to the greater force giving us a weaving action, which autogiro engineers call "articulation." See figure 6. If the lift becomes greater, the rotor raises, and if it becomes less, the rotor lowers. In the full size autogiro, all four blades are fastened at the inner ends with universal joints which permit not only up and down movement, but lateral also. The angle of the blade or angle of incidence, is fixed, however, at a slight positive angle. Apparently this lateral movement, which is restrained by elastic Rusco Aero Rings, is done only to minimize working stresses in the blades as they articulate up and down. At any rate, our junior autogiro blades do not articulate laterally.



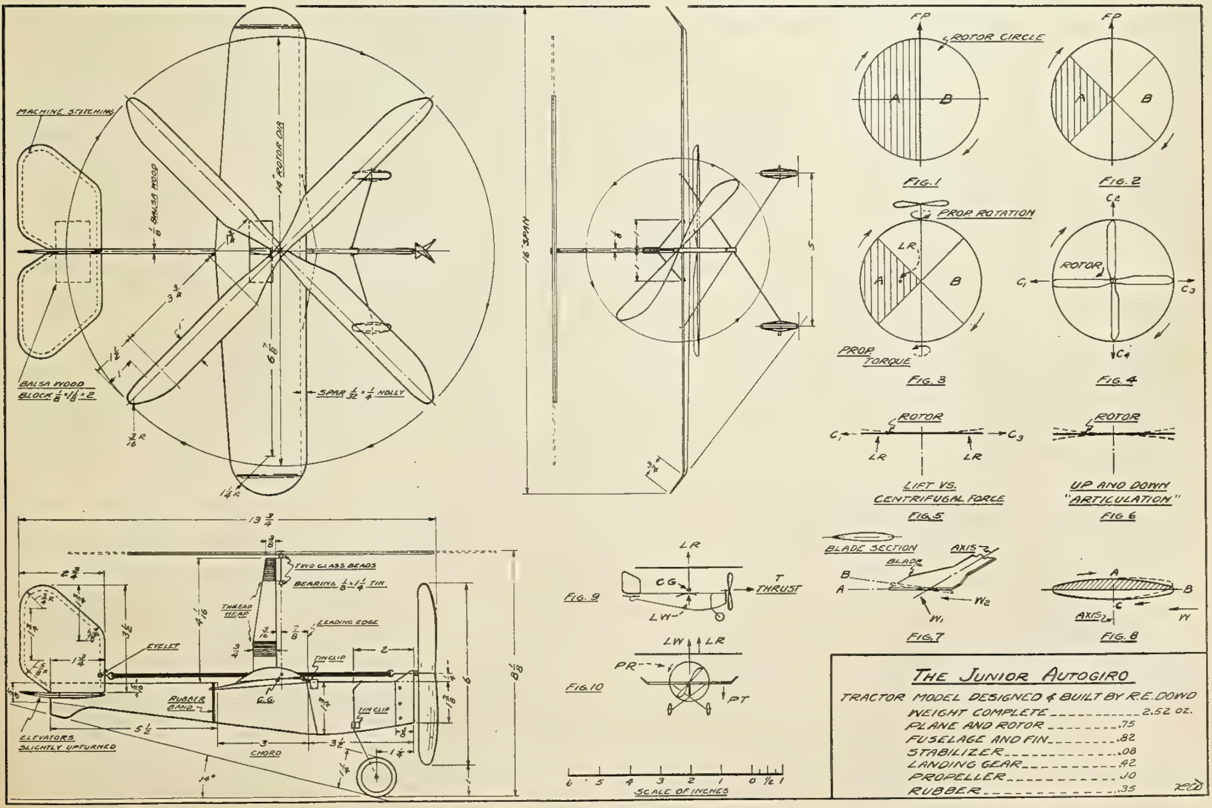
Detailed view of the rotor mast

Now that we have an idea of the fundamentals, we can take up this most interesting question, for it is only natural to ask: "If the rotor is not driven mechanically, what does drive it?" Some have ventured the opinion that the difference in resistance of the blade section, which is shown in figure 7, causes the autorotation. Since the section is streamlined or double-cambered there is a difference in resistance when the air strikes it from the front and rear, but as soon as this is sought as propulsion, the air velocity in section A (see figure 1) increases while B decreases, and if we are depending on this difference to drive our rotor we have only a feeble rotation, if any at all. A source of power far more energetic is required.

At this point we must assume you have made your model rotor in order to point out some simple experiments. Our rotor blades are thin and flat, having the corners sandpapered smoothly. It is in effect a flat bladed boomerang. If we drop it vertically without rotation it falls rapidly If we give it a spin and drop it, it settles slowly because more air distance is covered by each blade. If we drop it from a height without spinning, it will soon spin of its own accord. Figure 7 shows why. The air pressure acting back of the axis as shown by the arrow W, twists the blade and it rotates. If we throw the rotor as a boomerang, it will describe a circle and settle at our feet.

Having in mind what we have learned about articulation and lift, figure 8 is our next consideration. It shows the elipse rep-

(*Continued on next page*)



Scale drawings and construction details for building the Junior Autogiro, an interesting flying model

(Continued from preceding page)

resenting the rotor circle and the arrow W indicating the oncoming air. If the shaded portion is the A segment of figure 1, it is the side of greater lift. Consequently the blades articulate upward, but rather slowly, because the centrifugal force is pulling them out straight. We'll say at A the blades lift up from the circular plane and at B are quite elevated. In due time they settle back to normal as at C. The point of greatest articulation is dependent on many things and in the large machine is probably between B and C. Now, we can't have articulation without change of resistance, since the elevated blade has a greater angle of attack, and right there is the key to autorotation. In the large autogiro not only the greatest resistance, but also the greatest lift is in the B-C region, the effect of the articulation outdoing the greater lift in the shaded section caused by the increased velocity.

It is at this point our model differs from the large machine, for our articulation is limited to slight bending of the blades so that the original conditions as explained in figures 1 to 3 prevail. So you see, boys, we have not only studied the autogiro principle, but we have had to make a theoretical concession, and have had to design our model according to that concession. The stiffness of our rotor blades as compared to universally jointed blades probably explains this difference, which simply means that our rotor turns in the reverse direction relative to the propeller. Figure 9 is a side view of our finished model. Note that the C.G. (Center of Gravity) is the real center of the forces LR (rotor Lift) LW (wing lift) and T (propeller thrust). Figure 10 shows PR (propeller rotation) causing PT (propeller torque) which is balanced by LR (rotor lift), while the lift from the wing LW remains centralized.

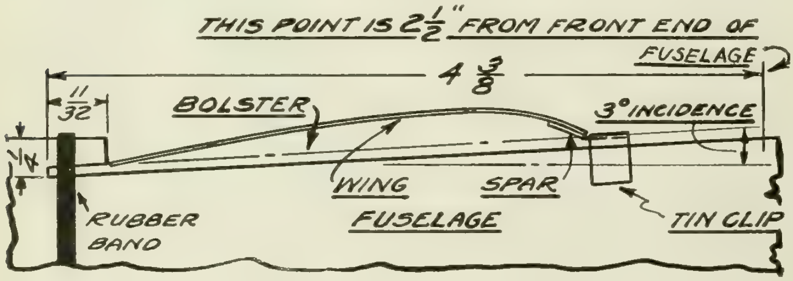


Figure 11. Full size detail of attachment of wing to the body of the Junior Autogiro

Build the Actual Model for Flight Tests

Fuselage—A piece of ⅛ inch thick balsa wood 1¾ inches wide and 12 inches long will make the whole fuselage. Cut to the shape shown in the assembly drawing and note carefully figure 11 for the form of the upper edge at the wing point. A thin tin or aluminum "U" shaped propeller bearing at the front end serves to prevent splitting. Cement and punched depressions will secure it in place.

Landing Gear—A single piece of music wire approximately 1/32 inch in diameter makes the landing gear by wrapping entirely around the fuselage. A notch in the upper edge of the fuselage locates the loop, while a tin clip ¼ inch wide forced through the balsa and bent back to wrap around the wire locates the lower part. The wheels are 1¼ inches in diameter solid wood, and the ends of the wire are bent around to hold them in place. By pinching the wheels together the loop around the fuselage opens up allowing the gear to be removed.

Fin and Stabilizer—Tough drawing paper is suitable for these parts. The two halves of the stabilizer are exactly the same form as the fin. The fin material should be a bit heavier, however, to stand the tension of the rubber. By folding the material on the leading edge and cutting the shape to a pattern they can be easily made. Either stitching on a sewing machine or cementing the edges together makes a workmanlike job. The fin is cemented to the fuselage by slitting the front edge. An eyelet provides a simple attachment for the rubber motor hook. Both halves of the stabilizer are fitted over a block of balsa wood and cemented in place. By notching both the fuselage and the block the stabilizer can be fitted in place easily. A tight fit will permit removability or it may be cemented permanently in the position indicated.

Propeller—Either a bent wood or a fiber propeller will work satisfactorily. Fiber about 1/32 inch thick will be found more durable, however. The diameter is six inches, and the blade width at the center is ⅝ inch while the widest part, two inches from the center, is one inch. The pitch can be easily given by twisting after dipping in hot water Be sure to twist it in the correct direction. See drawing. The 1/32 inch diameter music wire shaft wraps around the blade and is cemented in place.

Wing—The material for the wing is a tough fiber about .020 thick. The white pine bolster, figure 11, gives the correct shape and the tips are upturned. Small brads or wire staples can be used with cement to hold the bolster securely. The front end of the bolster fits into a ¼ inch wide tin clip which wraps over and is clinched into the balsa fuselage. A rubber band at the rear makes a shock resisting mounting. A piece of 1/32 inch music wire clips over the bottom edge of the fuselage and extends to holes in the wing spar 2½ inches from the center. The spar is 1/32 inch by ¼ inch preferably white holly cemented in place.

Rotor and Mast—The rotor blades are flat, being cut to the shape shown from white holly. The thickness is between .025 and .030 or a little under 1/32 inch. A T-pin as used to hold papers together, makes a convenient shaft. The lap joint at the center is wrapped with thread. A tin strip bearing and glass beads are used to minimize friction. See drawing. The mast of balsa streamlined in shape is supported by two strips of 1/32 inch thick aluminum ¾ inch wide by approximately 1¾ inches long. Small lugs or tabs 1/16 inch wide are left at each corner to clinch into the wing which is slotted at these points.

Rubber—Either eight or ten strands of ⅛ inch flat rubber will be found sufficient to drive the propeller for a powered duration of from six to ten seconds. Using a winder will permit longer durations.

Flying—Be sure your center of gravity (test by balancing) is located ⅞ inch from the leading edge and that the axis of the rotor passes through this point. After checking this point, using ballast at the extreme ends of the fuselage if necessary to correct discrepancies, you can try a glide by spinning the rotor before launching. The rudder (rear portion of the fin) may be used to correct turning, or wing tips may be warped. A glide from an elevation without spinning the rotor gave an excellent example of the autorotation principle. After gliding steeply at almost 45 degrees the rotor picked up speed and the gliding angle flattened out beautifully, the landing having been made gently with the rotor spinning rapidly. Initially spinning the rotor caused a uniform gliding angle throughout the flight.

Power-driven flights have been made for the full duration of the propeller thrust in which distances of over 100 feet have been covered, sometimes the landing being made vertically while facing into a slight wind just as amazingly as the real full-sized machine. Doubtless much longer flights can be made by a careful reduction of weight in order to permit greater power durations, but here's your start. Who will be the first to attain a one minute duration with a model autogiro? Remember also autogiro gliders and autogiro kites are possibilities. Why not get out the tool kit and get busy!

Just For a Check-Up

Can you name the types of heavier-than-air flying machines?

Who invented the autogiro?

What is autorotation?

What turns the rotor of an autogiro?

What is meant by "articulation?"

Name two advantages of the autogiro over the airplane.

REPRINTS of articles appearing in "Junior Activities" may be obtained free of charge by applying to the office of Aero Digest, 220 West 42nd Street, New York City. Previous articles in the "Junior Activities" section which have appeared are: "Make and Fly the Windjammer," "The 'Yardsticker' Sailplane"; "We Become Glider-Minded"; "Pegasus," "The Flying Horse"; and "Boomerange Made Simple."

Future articles by Mr. Dowd, written expressly for readers of "Junior Activities." may also be obtained in reprint form as they appear from month to month.

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Ask for Quaker State Aero Oil at your Airport—let your motor have it. It flows freely—bathing every working part the moment your motor starts. It laughs at heat. Even on a long, long hop it will keep your motor purring like a contented kitten. Try it—and see!

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FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

ENGLAND

EXPERIMENTS which included the running of an airplane engine for 600 hours without overhauling, and during which time the plane in which it was installed was flown 51,000 miles, have been completed by the British Government Aeronautical Inspection Directorate. The engine used in the experiments was a four-cylinder air-cooled type, all parts of which were sealed before the tests began, so that no repairs could be made.

Results of the tests showed that the bearings of the engine, which were made of solid white metal weighing 4½ pounds and containing 92 per cent tin, were only slightly worn and required no adjustments, and were capable of completing additional mileage. During the tests 2,644 gallons of gasoline and 294 pints of oil were consumed.

NATIONAL Flying Services, Ltd., recently issued a report covering the first six months of operation of the flying clubs supervised by the company. A total of 2,250 hours of flying were completed by the N. F. S. clubs during the period, according to the report, and a total of 25 aircraft were operated.

At the Hanworth Flying Club which opened on August 31, a total membership of 600 has been enrolled. Of this number, 145 have begun flying instruction, and of these 53 have qualified for solo instruction. 35 securing their licenses as private pilots. A total of 1,446 hours was flown at the Hanworth Club.

At the Hull Aero Club, which opened on October 11, a total of 87 hours was flown during the first month. Members of the Nottingham Club flew 55 hours in September and 45 hours in October. The Berks, Busks and Oxon Aeroplane Club at Reading which opened on September 23, reported 81 hours of flying by members at the end of October, and an additional 30 hours flown by November 12. The Yorkshire Aeroplane Club, which became affiliated with National Flying Services on October 15, reported 49 hours of flying at the end of October and approximately 80 hours by November 15.

National Flying Services has announced that the fleet of 25 aircraft operated by its clubs will be increased as deliveries are made on Desoutter three-place planes and Blackburn Bluebird machines which have been ordered.

THE Danish Military Air Force has ordered sixteen Bristol Jupiter Series F engines from the Bristol Aeroplane Company, Ltd. The engines ordered are an addition to a number of Bristol Jupiters which the Danish Military Air Force ordered from the Bristol company early in 1929.

THE airship *R-100,* sister ship of the *R-101,* was test flown at Howden, England, on December 16. The airship cruised above Howden at an altitude of 1,000 feet and then made a six-hour flight to Cardington and return. Major G. H. Scott, who commanded the *R-101* on its initial flight recently, was in command of the *R-100.* A crew of forty-five was aboard, including Squadron-Leader Booth, who will command the *R-100* in the future..

The *R-100* was constructed by a private airship company, and was contracted for by the Airship Guarantee Company at $1,500,000. It is a rigid type airship of 5,000,000 cubic feet displacement. It has a length of 709 feet, a diameter of 133 feet and is powered by six Rolls-Royce gasoline engines developing 4,200 horsepower and a maximum speed of eighty miles per hour. The airship has a cruising radius of 3,500 miles at an average speed of 71.5 miles per hour with full load. In addition to the fuel supply, the *R-100* will accommodate 100 passengers with 50 pounds of luggage for each, and a small quantity of freight.

A PAMPHLET entitled "Bumpiness on the Cairo-Basra Air Route," by J. Durward, has been issued by the Meteorological Office of the British Air Ministry. The author discusses the relative bumpiness of the various sub-sections of the Cairo to Basra route, and the relation which bumpiness bears to the time of day and to special meteorological conditions. In general, the air was found to be bumpy only near the ground. Occasionally, however, it was bumpy to a height of 12,000 feet. The worst part of the route from the point of view of bumpiness was found to be the Trans-Jorcountry in Palestine.

SOUTH AFRICA

NEGOTIATIONS for an airplane mail and passenger service between London and Capetown, South Africa, via Egypt, have been completed by the Imperial and Union governments, and are awaiting final ratification. Present plans include the operation of the Service by Imperial Airways, Ltd., from Alexandria to Capetown, via Khartum, Kisumu, Ndola and Johannesburg. Planes to be operated on the route will accommodate twenty-five passengers, according to present plans.

Upon the establishment of the airline from Alexandria to Cape Town it is planned to inaugurate a through service from Croyden to Cape Town and return, and to maintain a bi-weekly service.

SWEDEN

THE establishment of a daily airplane service between Malmo, Sweden, and Amsterdam, Holland, has been recommended to the Swedish government by an investigating committee appointed to study the organization of government-subsidized civil aviation. The committee also recommended the establishment of a night air mail service between Malmo and Stockholm along a route to be indicated by lighthouses at intervals of nine miles. The cost of constructing these lighthouses and other preparations for the night line is estimated at $536,000.

FRANCE

A NEW world's long distance record flight of 4,984.8 miles over a closed course was established by Capt. Dieudonne Costes and Paul Codos when they landed on December 17 at Istres Airport, Marseilles, France, in their plane, the *Interrogation Point.* On a triangular course between Marseilles, Avignon and Narbonne, the French fliers kept their plane in the air for fifty-two hours and thirty-four minutes without refueling. They will be presented with an award of $18,000 from the French government for breaking the record. The former record held by the Italians, Del Prete and Ferrarin, was broken by more than 200 miles. The *Interrogation Point* is the same plane in which Capt. Coste and M. Bellonte made the world's long distance record.

The French airmen, Costes and Bellonte, arriving at Le Bourget Airport, Paris, after having set a new world's flight record of 4,900 miles in their attempted non-stop flight to Tokio.

SPAIN

A NON-STOP flight from Seville, Spain, to San Antonio de Solto, Brazil, was completed on December 16 by Major Tadeo Lorre-Borges of Uruguay and Lieut. Challes of France. The fliers were en route from Seville to Montevideo, Uruguay, and after thirty-six hours of flight were forced down in Brazil out of fuel, having lost their bearings. The forced landing was made in a clearing on soft ground after nightfall, the pilots being slightly injured and the plane wrecked. The fliers maintained constant radio communication over a major part of the flight with surface ships and stations.

The plane used by Major Lorre-Borges and Lieut. Challes in their transatlantic flight was a Breguet biplane, powered with a 450-horsepower Lorraine engine and equipped with dual controls. Special pontoons were installed. Wireless equipment and two collapsible rubber boats were carried on the flight. The plane took off with 1,400 gallons of gasoline and 210 quarts of oil, estimated sufficient for fifty hours of flying.

THE Spanish government recently modified by royal decree a concession for the establishment of a transatlantic dirigible service between Seville and Buenos Aires, granted three years ago to the Sociedad Colon Trasaerea Espanola. The company encountered difficulties in the organization of its plans for the over-sea service and requested an amendment to the terms of the concession.

Under the terms of the modification, the government will divide the program of developing the transatlantic dirigible service into two stages, the first of which will be an experimental period. The government will subsidize the company to the extent of 15,500,000 pesetas as an experiment, following which the government reserves the right to discontinue, if this is thought expedient by the authorities. The second stage of development is a program of organization which the company will follow if the service is shown to be successful.

Provisions of the concession as modified specify the employment of dirigibles of a minimum capacity of forty passengers and ten metric tons of cargo; and the reservation for the government of space on each trip for two passengers and 1,100 pounds of cargo. The Sociedad Colon Trasaerea Espanola must also establish a weekly dirigible service between Seville and the Canary Islands, and will have the exclusive right to operate a dirigible service betwen Spain and Argentina for a period of forty years.

Further provisions include trial flights, construction of a hangar, mooring mast, and a factory for the manufacture of hydrogen, compressors and ethylene. These projects are to be completed before July 31, 1931. Further subsidization of the transatlantic service by the government will depend upon the success of trial flights from Seville to Buenos Aires.

In the event of the trial flights proving unsuccessful the contract will be rescinded and the government will acquire the grounds and installation of the operating company.

ITALY

THIRTEEN regular airlines operated in Italy extend over 9,360 miles and 58 aircraft are regularly employed. The services, together with their lengths in miles and the number and types of planes employed are as follows:

Turin-Pavia-Venice-Trieste, 360 miles, six Cant-10.

Genoa-Rome-Naples-Palermo, 672 miles, nine Dornier Wals.

Brindisi-Athens-Constantinople, 862 miles, one Dornier Wal.

Rome-Venice-Vienna, 618 miles, eight Junkers F.13 and G.23.

Trieste-Rome-Ancona-Venice-Trieste, 495 miles, two Cant-10.

Rome-Milan-Trento-Munich, 588 miles, six trimotor Fokkers.

Rome-Terranova-Cagliari, 306 miles, four Savoia Marchetti S-55.

Brindisi-Valona, 78 miles, one Savoia Marchetti S-55.

Rome-Genoa-Marseilles-Barcelona, 1,329 miles, two Dornier Superwals.

Rome-Siracuse-Tripoli, 2,034 miles, two Dornier Superwals.

Genoa-Rome-Alexandria (Egypt), 1,800 miles, two Dornier Superwals.

Tirama-Scutari, 57 miles, one Junkers F.13.

Tirama-Coriza, 75 miles, one Junkers F.13.

Tirama-Valona, 60 miles, one Junkers F.13.

FIRST TRANS-AUSTRALIA AIR RACE

[ERROL H. COOTE]

THE first transcontinental air race in Australia, which started September 30, was flown over a 2,500-mile coast-to-coast route from Sydney to Perth, with stops scheduled at designated fields en route. The race was held to commemorate the Centennary of Western Australia, under the auspices of the Australian Aero Club and the Centennary committee.

Fifteen planes out of seventeen which started at Sydney crossed the finish line at Perth. The route flown over included remote territory, some of it over mountains and deserts, and one leg of the flight was over water, across the Spencer Gulf from Port Pirie to Port Lowly. Fliers competing in the contest reported that severe head-winds were encountered on the flight.

E. H. Miller won the handicap and the £1,000 prize. He flew a DeHavilland 9, and his total elapsed time was 18 hours, 23 minutes and 45 seconds. The second handicap size of £300 was won by H. DeHavilland, in addition to a £300 prize for the fastest time. His actual flying time was 19 hours, 58 minutes and 58 seconds, flying a Gipsy Moth. A. T. Cunningham, in a Gipsy Moth, won third handicap prize and received the £100 award, with an actual flying time of 20 hours and 11 minutes. Four daily sectional prizes of £50 each were won by C. D. Pratt in a Gipsy Moth. All of the 15 planes which finished the race obtained average speeds of over 100 miles per hour. Most of the entries had been remodeled before the start of the race; dihedrals were flattened, landing and flying wires streamlined, exhaust pipes removed, and engine timing advanced, in order to reduce head-wind resistance as much as possible and to obtain the highest factor of speed possible for the race.

The seventeen starters took off at Sydney at 7:15 a. m., September 30, on the first leg of the flight to Junee, which lay over mountainous territory and required contesting planes to climb to an altitude of 2,000 feet. On the next stage of the race from Junee to Melbourne, severe head-winds and cross-winds were encountered.

The planes took off from Melbourne on the following day in the face of strong winds on the next leg of the flight to Nhill, which was over flat country. Several planes were forced down on this leg of the flight, but took to the air again and arrived at Nhill still competing in the race. The leg from Nhill to Adelaide followed railroad tracks and continued from Adelaide to Kimba, this leg of the flight being over the Spencer Gulf and territory covered with malleescrub.

A large crowd welcomed the fliers at Kimba and a reception was held in their honor. Dedication ceremonies of the Kimba Airport were held, the arrival of planes competing in the race being included in the events.

Following the reception and ceremonies, the planes left for Ceduna, the next leg of the flight. An over-night stop was made at Ceduna and the race was resumed the following day, the planes flying over the Nulla Plain, en route to the next stop on the flight at Cook. This leg of the race required difficult navigation, the fliers being required to fly across the desert to the tracks of the Trans Continental Railroad and follow the line to Cook, a small town of few hundred population. From Cook the race followed a route along the railway line, through dry and arid territory where brown dry earth extends for miles and little water is obtainable, to Forrest, the next stop scheduled on the flight.

From Forrest, the race continued to Rawlinna, and then to Kalgoorlie, the gold town. Several fliers in the race were forced to climb to an altitude of more than 2,000 feet to escape the severe heat close to the ground and to keep the engines cool. A dust storm was encountered on this leg of the flight. An over-night stop was made at Kalgoorlie, the planes leaving the following morning in exceptionally cold weather, which was a contrast to the heat of the day before. The next leg of the flight to Tammin was made against severe head-winds over sparsely settled country covered with forests. The planes stopped at Tammin and then took off on the last leg of the flight to Perth. The planes again encountered strong head-winds on the route, which lay over approximately forty miles of mountainous territory before crossing the finish line at Perth

CANADA

[JAMES MONTAGNES]

GAINS in Canadian commercial aviation are illustrated by reports issued recently by several of the larger companies in operation. The Compagnie Aerienne Franco Canadienne, using French-made Schreck flying boats, took 9,700 aerial photographs during the third quarter of this year, the photographic period; 5,800 square miles were covered in this photographic mapping campaign, and 850 passengers were carried. The flying time of the firm's planes totaled 395 hours.

Canadian Airways, Limited, the largest air mail carrier in eastern Canada, covered 80,538 miles in 284 mail trips between Montreal, Toronto and Detroit, carrying 14,313 pounds of mail during the third quarter of the year. Canadian Colonial Airways, operating mail between Montreal and New York, carried 29,501 pounds of mail during that period, during which Western Canada Airways carried 85,350 pounds throughout the western part of the Dominion. The total mail carried in Canada for the first ten months of the year amounted to 433,000 pounds, as compared to 277,184 pounds carried during the whole of 1928, an increase which shows the growth of air-mindedness on the part of the Canadian public.

Western Canada Airways, the largest operator in the Dominion, freighted nearly sixty tons of supplies into the northland during the third quarter of the year for forestry fire-fighting alone. The mileage run up by this company, whose operations extend from the international boundary to the Arctic Circle, during the third quarter of this year compares favorably with the annual totals of some of the leading American transport companies during the calendar year 1928. Western Canada Airways flew 313,639 miles during 1928. The company's total for the first nine months this year is nearly 625,000 miles, which total was exceeded last year by only three American operators: Boeing, National Air Transport, and Western Air Express. Passengers carried during the first nine months of 1929 numbered 11,000, while freight totals, exclusive of mail, came to 1,400,000 pounds, or 700 tons.

Ontario Provincial Air Service, a governmental air fire-fighting force operated for the protection of the vast forest territories in Northern Ontario, flew 850,000 miles from May 1st to the beginning of October. This service has twenty-seven planes. De Havilland Moths and HS2L flying boats. Thirty-one pilots and 37 air engineers comprise the operating staff on the service. With a new record of hours flown amounting to 11,500, the service reports that it had no injuries to planes or passengers during its operations this year, although it encountered one of its most difficult seasons.

Night flying in Canada is progressing with the recent opening of the Hamilton-Detroit airline via London, Ontario. This line is now fully lighted and has been officially placed in operation.

Meanwhile, work on the lighting of the Winnipeg-Calgary airline is progressing, all sites for lights having been selected. There will be fifteen twenty-four-inch rotating beacons of 3,000,000 candlepower each on this course. Fourteen-inch course lights will be installed at the fields at Winnipeg, Brandon, Medicine Hat, Calgary, Saskatoon, North Battleford and at seven emergency fields. Forty-one acetylene beacons are being installed between Broadview, Saskatchewan, and Calgary. These lights are of 3,000 candlepower and will be placed at ten-mile intervals along the course. Radio beacons are now being installed at two points along the Winnipeg-Calgary airline, at Regina and Forrest, Manitoba.

THE Aviation Corporation of Canada, Ltd., is the new holding company of the largest merger of airplane operators in eastern Canada. Interprovincial Airways, Ltd., operating between Montreal and Detroit; Fairchild Aviation Ltd., engaged chiefly in photographic work; Canadian Airways, Ltd., operating the air mail between Toronto and Montreal; Canadian Transcontinental Airways, Ltd., operating the air mail between Ottawa, Montreal and Rimouski; and Maritime Airways, Ltd., operating in the three Maritime provinces, make up the companies controlled by the new concern.

THE new Vancouver Municipal Airport, Vancouver, B. C., is located on Seal Island, at the mouth of the Fraser River, and consists of 459 acres, with provisions for seaplane bases. The cost of the land is said to be approximately $250,000.

THE Canadian Pacific Express Company announce an arrangement with European aviation companies to carry their express shipments. Arrangements have been made with the Air Express Company whereby an all-metal Junkers monoplane may be used to carry four passengers for either long or short distance business trips from London to points in Europe. The transportation of freight and express matter is to be undertaken in a like manner.

REGULAR air mail service has been inaugurated between Oskelaneo, Province of Quebec, and Chitbougamau, P. Q., according to a recent announcement of the Poastmaster General. An experimental air mail service between Montreal and Saint John, N. B., via Quebec and Moncton, N. B, has also been inaugurated.

MEXICO

[MONT HURST]

MEXICAN Aviation Week was held at Mexico City, Mexico, December 10 to 15. An air meet and aircraft exhibition were held in conjunction with the event. Sixteen aircraft manufacturers of various countries exhibited planes and aircraft accessories, and planes of the United States Army Air Corps and the Royal Air Force of Great Britain were on exhibition.

Included in the aerial demonstrations held in conjunction with Mexican Aviation Week was a sham attack on Mexico City by bombing and pursuit planes, and defense formations by other squadrons. Many planes gave aerial demonstrations of maneuverability and performance over Valbuena Field where the aircraft show was held and over Mexico City with military and civilian pilots at the controls.

ONE air regiment consisting of thirty-one airplanes, divided into three squadrons, comprises the Mexican military air force, according to the aeronautical division of the Mexican Department of War and Marine. Formation of another air regiment is planned and preparations are being worked out to secure the necessary planes and equipment and to muster in an added number of pilots.

The government expects no difficulty regarding the supply of aviators as more than a sufficient number of qualified fliers will be supplied by aviation school graduates, not counting experienced civilian fliers ready to enter the service. The total number of Mexican military airplanes is at present fifty. School machines include one DeHaviland Moth, one Azcarate, ten Anahuacs, one Morane-Dornier and one Braun Nenette. Observation planes include two Baja Californias, one Azcarate, one Stinson-Detroiter, one Salmson and one Hanriot. The air force has ten Vought Corsairs, with 450-horsepower Wasp engines, nine Douglas planes with 525-horsepower Hornet engines, and nine Bristol machines equipped with 300-horsepower Hispano-Suiza engines. All of the foregoing are light bomber type machines or observation planes. A Vought Corsair and a Cessna are used for transport. During the years 1928-29 the Mexican Air Force planes flew 1,150 hours, covering a distance of 103,385 miles.

A NEW air field is to be constructed soon at Santa Rosalia, Lower California, according to recent advices received from that city. The project has been considered for some time by the city of Santa Rosalia, which hopes to promote commerce with the interior districts by means of airplane communication and services.

THREE airplanes belonging to the Mexican Department of Communications and left over from equipment of the Mexico City-Laredo government mail route have been distributed among the three recognized aviation schools of the Republic by President Portes Gil. The schools are the Nautical and Civil School of Vera Cruz, the Emilio Carranza School of Mexico City and the Civil Aviation School of Monterey. The President made the donation of the planes to encourage the training of citizens.

A DECREE was signed recently by the President of the Mexican Republic creating the order of Aeronautical Merit for Mexican aviators and air scientists whose deeds and performances are deemed of extraordinary merit. The decoration is in three classes: first, second and third, accord-

(*Continued on next page*)

(*Continued from preceding page*)

ing to comparative grades of merit. Pablo L. Sidar, Mexican goodwill flier to Central and South American countries, will be given the first-class medal; Col. Roberto Fierro will receive second-class in recognition of his flight to Havana and Central American republics; and Col. Gustavo G. Leon will be awarded the third-class medal for his flight across the republic. In recognition of his services to the country in airplane designing and construction, General Juan F. Azcarate, Secretary of War and Marine and head of the air department, will also be decorated. Another who will be honored with a medal is Sidar's mechanic, Cortes.

A NEW military aeronautical squadron will be formed by a recent order of the Mexican Department of War and Marine. It will be commanded by General Pedro C. Caloca, who recently returned from a trip to Europe. The air squadron will be separate from the aeronautical department, as it will be purely a military organization.

BOLIVIA

A TOTAL of 1,972 flights was completed on October 1, 1929, by the Bolivian Lloyd Air Lines, operating passenger, mail and express airplane service throughout Bolivia, according to figures recently compiled on the activities of the company covering its total period of operation. The number of passengers carried totaled 7,903; 41,294 pounds have been carried in planes of the Bolivian company, including passengers, mail, baggage and express; and 267,291 miles have been flown by planes of the Bolivian Lloyd Air Lines in 3,086 hours of flying time.

THE Lloyd Aereo Boliviano, aerial transport firm of Bolivia, has been authorized by authority of the Ministry of War, to establish a fortnightly air service for passengers and express between Trinidad and Riberalta, via Santa Ana, Guayaramerin, Villa Bella and Cachuela Esperanza. The contract between the government and the company runs until June 1, 1934, and by its terms the company will receive an annual subsidy equivalent to $18,000 for the fortnightly service over this route.

PERU

[HAROLD GÓMEZ-CORNEJO]

ELMER E. FAUCETT, head of the Faucett Aviation Company, arrived in Lima recently from Santiago and Buenos Aires, completing a round trip between Lima and the two southern capitals. The plane used on the trip was a Stinson-Detroiter fitted with a 425-horsepower Wasp engine.

SCADTA (Sociedad Colombo Alemana De Transportes Aereos) established in 1919, is now operating in Colombia and Ecuador and is one of the most successful aviation concerns in Latin America. The company has a capital of $400,000, Colombian currency. Its dividend record has been continued since 1921. Scadta paid 10 per cent in 1926, 12 per cent in 1927 and 14 per cent in 1928. Señor Carlos Daniel Rocca, well-known Barranquilla business man, is president, and the concern is owned largely by Colombian capital.

A German technical staff is employed as well as German equipment. The air fleet of the company now consists of ten Junkers six-place seaplanes, two Junkers six-place landplanes, two Dornier eight-place seaplanes, one Dornier twelve-place flying boat and three DeHavilland two-place air mail planes. Planes of the firm fly approximately 62,000 miles per month. Scadta operates four main lines as follows:

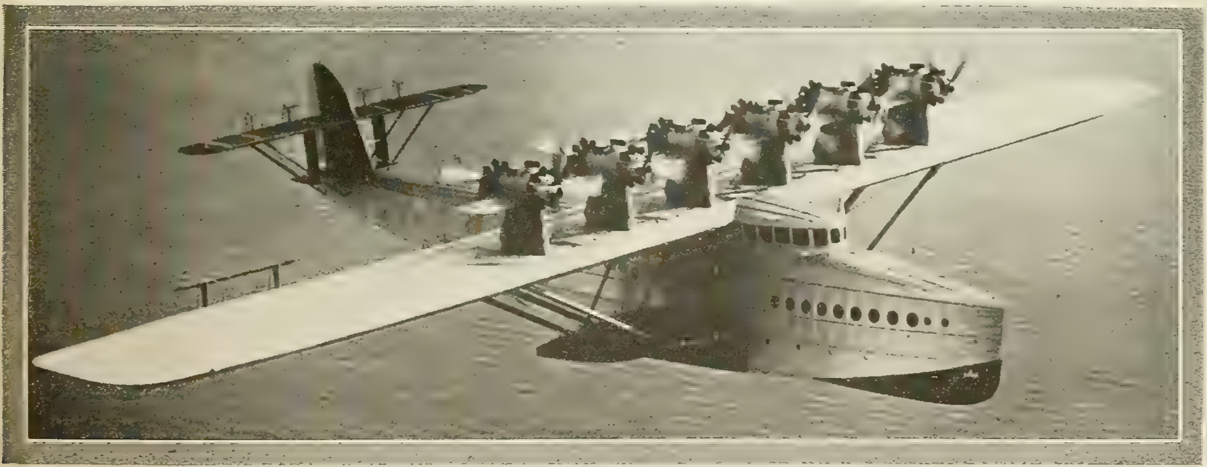
Barranquilla to Gamboa daily, including Sunday: Leaving Barranquilla at 5:30 a. m., the plane reaches Gamboa on the Magdalena River at 2 p.m. From this point the traveler can reach Bogota by motor car by 8 p.m. To reach Medallin, the traveler leaves the Barranquilla plane at Puerto Berrio, arriving at Medallin by rail the same day. On this line there is also a tri-weekly branch landplane service from Puerto Vilchez and Barranca Bermeja to Bucaramanga; a weekly service, mail only, from Bogota to Girardot and Inague. Barranquilla to Cristobal, via Sautata: Planes leave Barranquilla every Wednesday and Cristobal every Thursday. Barranquilla-Buenaventura-Guayaquil: Plane leaves Barranquilla for Buenaventura every Thursday, and proceeds from Buenaventura to Guayaquil the following Friday. Northbound plane leaves Guayaquil for Buenaventura every Tuesday and Buenaventura for Barranquilla, via Sautata, on the following Wednesday. Connection is made at Sautata with the Barranquilla-Cristobal plane so that passengers from Buenaventura to the Canal Zone may reach their destination the same day. Buenaventura-Balboa-Cristobal: This is a local service along the West Coast of Panama and Colombia. Planes leave Buenaventura for the Canal Zone on Fridays, making stops at ports on the way and reaching the Canal Zone the same day. The return trip from Cristobal and Balboa to Buenaventura is made on Saturdays.

It is planned to establish a tri-weekly service between Buenaventura, Cali, Girardot and Bogota at an early date. Several trial trips over this route have already been made.

COLOMBIA

THE Colombian Government has been authorized by the national Congress to acquire property in Colombia for the construction of landing fields in a program of general aviation development. The Congress has also specified that, once the fields are established, the government may proceed with air mail service. The act authorizes contracts with individuals, companies and municipalities for the construction and operation of flying fields. Immediate plans include the enlargement of the airport at Madrid, which is owned by the government.

THE Compañia Colombiana de Rutas Aereas, S. A., Bogota, has been formed to operate commercial airplanes and seaplanes on routes scheduled throughout Colombia. The company will operate passenger, mail and merchandise planes and will be equipped for map making and aerial photography.



The Dornier Do.X. flying boat in a recent flight over Lake Constance. Dr. Claude Dornier recently completed plans for the manufacture of Dornier planes in America.

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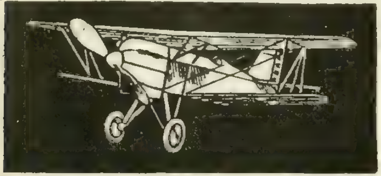

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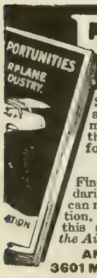

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NEW DAVIS AIR-KIT

BULLARD-DAVIS, INC., New York City, manufacturer of first-aid and safety equipment, has designed a new airplane first-aid kit. The Davis Air-Kit is made of aluminum, and with the contents, weighs only eighteen ounces.

Each dressing and treatment is individual, complete for use once—nothing left over, nothing to put back. In the unit cartons are one or more of these individual dressings or treatments. Pictorial instructions for each type of treatment appear on each unit carton. The assortment of dressings are said to fill all the exacting requirements for emergencies.

The Davis Air-Kit has been approved by the Aeronautics Branch of the Department of Commerce.

This kit includes the following:

Four-inch bandage compress—1 compress per unit.

Two-inch bandage compress—2 compresses per unit.

One-inch adhesive compress—16 compresses per unit.

Mercurochrome swabs—10 per unit.

Ammonia inhalants—10 per unit.

Borated petrolatum—6 tubes per unit.

auze compress—1 compress per unit.

Aromatic spirits of ammonia—4 ampoules per unit.

NO-NOCK HYDRAULIC PISTON RINGS

NO-NOCK Hydraulic Rings, which are manufactured by Budlong & Funchess, Hanford, Calif., are made in two pieces with a groove on the inner edge of each piece, and the scraping edges on the face of the ring pick up the surplus oil from the cylinder wall and drive this oil between the two pieces of the ring, under heavy hydraulic pressure, spreading the two pieces of the ring in the ring lands.

The higher the oil pressure in the cylinder, the tighter the ring is sealed in the groove. The oil which is collected by the sharp-edge grooves in the upper and lower half of the ring, scraping the oil both ways and crowding it under pressure, spreads the two pieces of the ring in the ring lands and becomes trapped behind the ring in the groove. Being under constant pressure while the motor is in motion, this oil creates an outward wall pressure, so that the ring hugs the cylinder wall in accordance with the motor speed.

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THE Thermal Unit System of space heating and cooling for airplane hangars, factories, plants, offices, public buildings and cold storage warehouses is manufactured and sold by the Thermal Units Company of Chicago, Ill., a subsidiary of the Mechanical Manufacturing Company of New York City.

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Water Pressure Distribution on a Twin-Float Seaplane

SYNOPSIS OF N.A.C.A. REPORT No. 328

By F. L. THOMPSON

THE investigation described in N.A.C.A. Report No. 328 was conducted by the National Advisory Committee for Aeronautics at the request of the Bureau of Aeronautics, Navy Department. This is the second of a series of investigations to determine water pressure distribution on various types of seaplane floats and hulls, and was conducted on a twin-float seaplane. It consisted of measuring water pressures and accelerations on a TS-1 seaplane.

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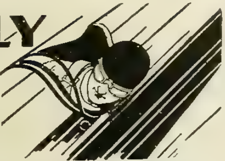

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A. F. STOEGER, Inc. NEW YORK, N.Y.
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steam channel and extended heating surfaces are cast integrally. All castings undergo a factory test of 400 pounds pressure.

The heating section, electric fan and deflectors are assembled into a small, compact cabinet. Hangars for supporting the unit are standard equipment, but the unit is designed to be suspended from the steam line and may be hung up and placed out of the way, its small size making it inconspicuous.

Standard units are made from three to nine sections wide, according to the amount of heat required.

Effect of Supercharger Capacity on Engine and Airplane Performance

SYNOPSIS OF N. A. C. A. REPORT No. 327

By O. W. SCHEY and W. D. GOVE

THE effect of different supercharger capacities on the performance of an airplane and its engine was investigated by the staff of the National Advisory Committee for Aeronautics at Langley Field, Va. The tests were conducted on a DH4-M2 airplane powered with a Liberty 12 engine. In this investigation four supercharger capacities, obtained by driving a Roots type supercharger at 1.615, 1.957, 2.4 and 3 times engine speed, were used to maintain sea-level pressure at the carburetor to altitudes of 7,000, 11,500, 17,000, and 22,000 feet, respectively.

The performance of the airplane in climb and in level flight was determined for each of the four supercharger drive ratios and for the unsupercharged condition. The engine power was measured during these tests by means of a calibrated propeller.

It was found that very little sacrifice in sea-level performance was experienced with the larger supercharger drive ratios as compared with performance obtained when using the smaller drive ratios.

The results indicate that further increase in supercharger capacity over that obtained when using the 3:1 drive ratio would give a slight increase in ceiling and in high altitude performance, but would considerably impair the performance for an appreciable distance below the critical altitude.

N. A. C. A. Report 326

REPORT No. 326 of the National Advisory Committee for Aeronautics entitled "Tests of Five Metal Model Propellers with Various Pitch Distributions in a Free Wind Stream and in Combination with a Model VE-7 Fuselage" was prepared by E. P. Lesley and Élliot G. Reid. The report describes the tests of five adjustable-blade model propellers both in a free wind stream and in combination with a model fuselage with stub wings. The tests were conducted at Stanford University under research authorization of the National Advisory Committee for Aeronautics.

The results of the tests showed that the efficiency of a propeller is generally less over the working range when operating in the presence of the airplane than when operating in a free wind stream. The results also showed that a propeller with a radial distribution of pitch of the same nature as the radial distribution of air velocity through the propeller plane suffers a loss of efficiency.

Curtiss-Wright Leases Oakland Hangars

WITH the taking over of Hangar No. 5 at Oakland Municipal Airport by the Boeing School of Aeronautics, the space formerly occupied by the company in Hangar No. 1 has been leased to the Curtiss-Wright Flying Service. The Curtiss-Wright organization has established flying offices for the northern California area in this hangar. Capt. William Royle is in charge. D. C. Warren, Travel Air dealer, and the Wright Air Service have been assigned to the area formerly occupied by the Boeing organization in Hangar No. 2.

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PRICED FOR QUICK SALE!
Six AMERICAN EAGLE Biplanes
(Curtiss OX5 Powered)
One WALLACE TOUROPLANE

American Eagle Wallace Touroplane, two place, powered with 120 h.p. Anzani motor. 3 hours time on motor since overhaul. Paint and covering good as new. An excellent performing plane and priced right at $1575. The new Wallace sells at $5795. Price F.O.B. factory, Kansas City, Kansas.

American Eagle three place biplane (D. of C. license number on request) powered with Kinner 102 h.p. radial type motor. Plane has been used as demonstrator and has had only 72 hours. Is in excellent condition. Priced $3300 F.O.B. factory.

American Eagle three place biplane (D. of C. license number on request) powered with Kinner 102 h.p. radial type motor. Plane has been used as demonstrator and has had only 130 hours. Is in excellent condition. Priced $3000 F.O.B. factory

American Eagle three place biplane (D. of C. license number on request), Hisso E. 180 h.p. motor. Color, red and sand; motor turns 1650 on ground and 1780 r.p.m. in air. Plane in A-1 condition and never in mishap. Priced $1595 F.O.B. factory.

Plane No. NC5991; Red and Desert Sand; Motor turns up 1360 on ground and 1380 in air; completely overhauled with no time since overhaul. Priced $1875 F.O.B. factory.

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Plane No. NC6924; Blue and yellow with burnished cowling; Motor turns up 1360 r.p.m. on ground and 1380 in air; no time on motor since top overhaul. Priced $1875 F. O. B. factory.

All of these planes are in perfect condition. Previous owners have taken best of care of these planes. All were taken in on trades for American Eagles with air-cooled motors and are excellent buys for training service or private use. Terms to responsible parties.

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1—OXX-6 Curtiss.
5—OX-5 Curtiss.
1—110 hp. Anzani.
Write for information and prices.

FLYING IN CENTRAL AFRICA

(*Continued from page* 60)

managers of mining and prospecting operations and their technical assistants are Americans or Canadians and they have naturally introduced many customs and methods developed in North America. It is an increasing custom in North America to make use of aircraft wherever they are likely to speed up construction, production or reduction of costs, and American mining engineers were chiefly responsible for the application of aerial photographic surveys to the copper fields of Northern Rhodesia.

Many mining engineers claim—though others dispute—that certain copper ores when covered with only a thin layer of earth so affect the vegetation that the presence of the ore may be detected by a study of the relative differences in the growth of the trees in the locality.

The holders of the concession of 52,000 square miles including N'Changa were using airplanes to obtain aerial photographs to enable the geologists to locate the most favorable appearing places to make intensive investigations on the ground.

The planes used were war-type tractors with single water-cooled motors. The cameras were of English manufacture, with focal plane shutters taking about 100 exposures per roll of standard aero film, which is nine inches wide. The actual photograph is only seven inches square, since the remainder of the width of the film is used to photograph a set of instruments and a data card.

The camera in each plane was mounted on a rotating ring with an arrangement permitting the taking of either vertical or oblique photographs. When required for oblique photographs, the camera would be lowered and tilted in such a manner that photographs showing the horizon could be taken with the camera pointed directly back along the line of flight and at ninety degrees to each side of it, with due allowance for rotating to counteract the effect of drift when flying across wind.

Lenses of various focal length were used, depending upon the nature of the country photographed and the results desired, but seven-inch lenses were used chiefly on this particular survey.

On preliminary aerial photographic surveys the airplanes would frequently fly in pairs; one carrying a camera operator, and the other a geologist who would, by a system of signals, advise the camera operator when to take photographs of certain sections of the ground which appeared to him to be of interest.

The usual altitude from which the photographs were taken was 10,000 feet above the ground, but sometimes they were taken much lower than this.

After the preliminary investigation, certain areas would be selected for complete coverage with oblique or vertical photographs. In the latter case, the photographs would be taken with sufficient overlap to permit their being used under a stereoscope, with the result that, to the observer, every tree, hill and rock would stand out in relief and would, in effect, provide a small but accurate representation of the terrain in the form of a model with uniform horizontal scale.

The oblique photographs were used for general study and also for supplying the necessary data in compiling line-maps to serve for base maps for the geological survey parties and for general mapping purposes.

The strips of oblique photographs were tied together by the intersections with strips of verticals, which in turn were definitely located in their relation to each other by astronomical observations at frequent intervals.

Aerial photographs have demonstrated their usefulness beyond all possible question of doubt—not so much in locating ore by their means alone, but in generally assisting and speeding up the work of men on the ground. Aerial photographs can never eliminate the geologist or surveyor, but they can enable him to do his work more quickly, more easily and more efficiently than by any other known methods.

After completing one season's operations at N'Changa, the expedition was reorganized, with the writer in charge; and while part of the original staff went to carry out aerial surveys in Iraq, the remainder moved to the town of Bulawayo, in Southern Rhodesia, where permanent headquarters were established and additional personnel engaged. From this base flying operations were conducted in all directions within a radius of 1,000 miles.

Many difficulties were met and overcome, and many places were seen where forced landings would have been rather unpleasant. In fact, there were several unpleasant forced landings.

In one case, two airplanes were operating from a sub-base about 150 miles from the base at N'Changa. One plane had flown to the base with exposed film and was taking back a load of supplies but with no one on board except the pilot. Half way on the return trip the engine ran out of water and seized up. The pilot landed on a large patch of open prairie in the forest.

He waited twenty-four hours and when nothing happened he walked through the bush, by compass, for about thirty miles to a mining camp from which he got in touch with the sub-base. After trying to take a spare engine through the bush on a truck, we found it possible to fly the necessary replacements to the stranded plane, and it was repaired and taken off successfully.

On another occasion, about a year later, one of the planes was operating as a seaplane on the Zambezi River when strong head-winds and poor visibility prevented its reaching its destination, a sub-base twenty-eight days by river travel from the base on the railroad. The pilot landed on the river about thirty miles down stream from his base of supplies and a message was sent by native runner, but when a large load of supplies and fuel arrived a couple of days later, it was found that the floats were leaking too badly to take off. Several days were spent getting the floats out of water. This was quite a job, for the men had no means of raising the plane. Finally after utilizing a system of levers actuated by buoyancy resulting from filling a barge with water to make it sink and then bailing it out, the men were able to work on the bottoms of the metal floats and found that corrosion had so affected them that one was almost like a basket. They managed to patch them up sufficiently to enable the seaplane to return to the railroad base, but the floats had to be discarded.

Malaria-bearing mosquitos, and tsetse flies which carry the sleeping-sickness germs, were plentiful but no serious trouble was experienced through animals, insects or germs, with the exception of the perpetual fight against white-ants. The ants are the curse of the country and are to be found everywhere waiting to destroy everything not made of metal, rubber or stone. Only a few kinds of native woods are immune to their destructiveness, and ordinary imported woods are destroyed almost over night if not insulated against them.

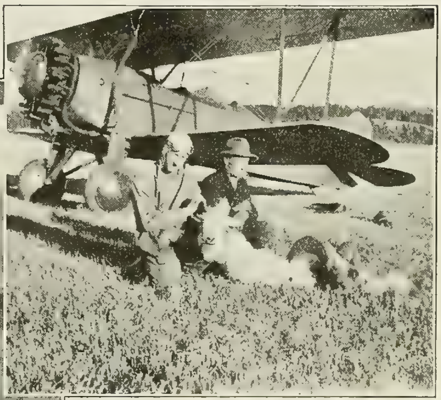
In all aerial survey operations the conditions on the ground are of great direct interest to the operators, because bases have to be prepared and supplied; and in many cases, the operators must also employ ground survey parties for supplying controls. In Africa there is an unlimited field for aerial photographic surveys, and American and Cana-

(*Continued on next page*)

SPORTSMEN TO THE FRONT!

. . . here are two Airplane Hunters who rate your eye and ear

Mr. R. F. Garland, experienced sportsman-hunter and oil operator, Tulsa—"made a landing within 200 feet of the club house . . . rolled not over 75 feet



● Mr. Wakefield and Mr. Elkins "bagged a mountain sheep a half hour after landing"

. . . . . . When your trigger finger "itches" . . . get into action "pronto" with a Stearman ship. . . . R. F. Garland, oil operator and sportsman, reaches his hunting club near St. Charles Bay, Texas, from his home in Tulsa, in five and one-half hours. By train or automobile the trip would take two nights and a day. . . . Newton Wakefield, one of the best known hunters of the Northwest, used to spend six days getting to big game country. In a Stearman he reaches his hunting ground in a few hours. . . . Both agree, Stearman is the ship to use . . . because it is better fitted to needs of sportsmen . . . gets in and out of tight places . . . carries heavy loads in all altitudes . . . makes short landings and quick take-offs—"Stearman is the only ship we felt safe in letting hunters use over such rough country", wrote Nick Mamer of Transcontinental "Sun God" fame . . . either the Business Speedster or the Junior Speedmail series is adaptable to sport or commercial flight. Write or wire us.

STEARMAN

STEARMAN AIRCRAFT COMPANY, WICHITA, KANSAS
Division of United Aircraft and Transport Corp.

STEARMAN AIRCRAFT COMPANY WICHITA KANSAS

(*Continued from preceding page*)

dian operators stand just as good a chance as citizens of any other nation if they want the business and go after it.

In 1928 one of our ground survey parties was working in Portuguese West Africa for a few days, taking observations on the stars in connection with the mapping of one of the tributaries of the Zambezi which takes its source on the Portuguese side of the line. Arrangements had been made the previous year and permission had been promised, but when the surveyor set up his transit and started shooting the stars, he was arrested—no reason given but apparently it was for shooting without a big-game license. He was held in detention for two months, and when released, had great difficulty in making his way through the tropical swamps in the rainy season, to the nearest outpost in British territory.

In the basin of the Zambezi there are two seasons: the rainy season and the dry season, and both of them are hot. Being south of the equator, this section has its coolest season about June and July and the hottest about November and December. From the middle of October to the end of March, it rains some part of nearly every day. At first there are frequent and violent thunderstorms, but after Christmas it generally settles down to a regular downpour of rain part of every day and most of every night.

From May to the middle of October, there is no rain and for months not a cloud appears in the sky.

The ideal time for aerial photography is at the beginning of the dry season before the smoke of burning grass spoils visibility. The fires are set by the natives to drive game to where the animals can be easily speared, for the government does not allow them to have rifles.

Unfortunately, because other conditions may make it more desirable to conduct the survey at a period of the year when the ground is not obscured by the dense grass, or at a season of the year when the water is low, photographs have to be obtained in spite of the conditions tending to make poor visibility.

We found that Eastman Kodak Aero film was much better than anything procurable, up to that date, in England. This was used with American filters, and very satisfactory results were obtained.

In some places difficulty was experienced in keeping the laboratories and water at a sufficiently low temperature, but by making dead-air spaces with plenty of ventilation in the walls and roofs and by keeping buildings and water tanks cool by evaporation, the worst effects of heat were overcome.

Although were were not equipped with radio, several of us were enthusiastic amateurs and had home-made short-wave transmitting and receiving sets. After it had been demonstrated that we could work in code with stations all over the union of South Africa—a maximum distance of 1,700 miles—using only 250 volts, from dry batteries, the Anglo-American Corporation, controlling the operations of numerous mining companies, established several experimental radio stations for intercommunication between the mines and to serve as relay stations for telegrams and cables from mines which had no telephonic or telegraphic connection with the main telegraph line to the coast.

It is now a regular thing for messages to be sent by radio to the nearest radio station on the telegraph line, with the request that they be forwarded to the destinations given.

Shortly after the aerial survey expedition had moved to Bulawayo and before I had set up my transmitter, I happened to overhear a message which was being sent from N'Changa to Broken Hill asking the latter to wire me to telegraph the latitude and longitude of a certain point appearing on a certain aerial photograph. I heard this about seven o'clock in the evening, and when the telegraph office opened next morning, I sent a telegram beginning as follows:—"In reply to your telegram not yet received the information you desire is as follows...." Nine hours later I received the telegram asking for the information.

On one occasion we were making an aerial survey of a section of the Zambezi River flowing through a large territory called Barotseland, which, although included in Northern Rhodesia, is ruled over by a native king—the official title recognized by the British authorities being "Paramount Chief." He and the royal family are black but very intelligent, and are reputed to have descended from the rulers of the ancient people who worked the mines and constructed the massive ruins of dry masonry to be found in various parts of the country. In fact, his country has been surprisingly accurately but unintentionally described in Rider Haggard's famous romance, "She." He probably has more power than either the King of Italy or the King of Spain, but his royal chariot has the power of only one old Ford engine.

If Henry Ford could see that royal Lizzie, he would probably send King Yeta a real royal coach and add the present one to his museum. It is the only automobile in the kingdom, and for unknown years it has been carefully nursed by one of the royal princes, whose printed stationery bears the title, among others, of "Chief Engineer to the Paramount Chief."

We had obtained permission to establish a base in his territory and one day received a typewritten letter from the "Chief Private Secretary" stating that His Majesty would be pleased to inspect the airplane and would arrive, with his retinue, the following day.

Next day a small army was seen approaching across the prairie, headed by an old Ford car. The car met a sandy spot where the wheels spun around, and the royal party made little progress in spite of the whir of the motor running in low gear; but with the precision of long practice, forty or fifty natives raced to the front of the car, grasped a coil of rope looped over the radiator for that very purpose, and singing the national anthem, towed the royal party to hard ground, after which the little old Ford rambled along until the performance had to be repeated.

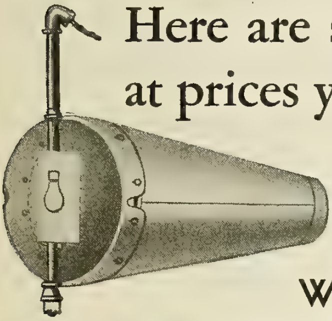
His Ebonic Majesty was so impressed with the airplane that he felt the urge to aviate and determined to go for a flight, but, being a true gentleman, he decided to see first if the mississes would raise any objections. So he went home and came back a few days later. Apparently the royal harem had something to say, and said it, for it was agreed that the crown prince would go instead. In his explanation to us, the king said that he wished his son to go up "in order that we may see him in the air higher than any of my people have ever been and that he may be enabled to describe to us the emotions which are experienced in this unique mode of transportation."

The crown prince appeared to be a little shaky at the knees but bravely trying to follow his father's will. The pilot took him up but was careful not to loop him.

After the completion of the contracts, the expedition remained in Africa with the expectation of securing other contracts, but several months ago I returned to North America after two very interesting years in Africa. My departure was speeded up by my having malaria and two appendicitis operations in less than a month.

Before many years there will be hundreds of airplanes in daily use in Africa, for it is a wonderfully rich country and its natural resources have barely been guessed at. Living conditions may be different from those of the United States, but they are not so bad as thev may appear.

GET THESE NOW



Here are seasonable items—universally needed—at prices you can't resist. Now is the time to avail yourself of these splendid bargains!

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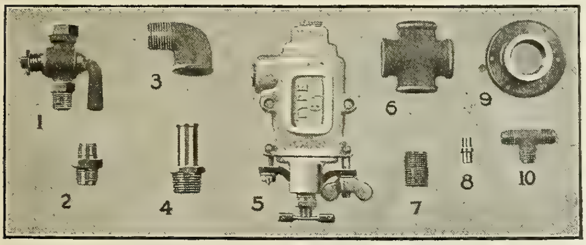
Here are quality wind indicators. Not made from dyed materials which rapidly fade in weather; we spray the goods in the cone with a mixture of chrome yellow that preserves the materials and makes the color last. Style 2 shown above, Department Commerce Standard, internally lighted. Heavy and durable in construction; suspended from a tower or mounted on ¾-in. pipe standard; reflector moves with cone, light and wiring remaining stationary. Cone, fittings, lighting fixtures, complete $53.00. Cone only . **$9.00**

Johnson Flying Suits

The Commercial Ace No. 34 Suit is an exceptionally fine winter suit at a moderate price. Olive drab, water proofed, sheepskin cloth; lined throughout with wool sheepskin; wide fur collar; zipper fasteners; large pockets; sizes 36 to 48; price only $60.00.

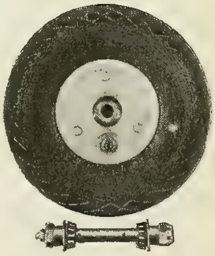
Johnson's Special Winter Flying Suit No. 37 is similar to No. 34 except has a beautiful wool blanket lining. Not quite as heavy, but exceptionally warm and comfortable—and priced at a genuine bargain at only **$35.00**

Cone Style No. 3, Department of Commerce Standard for airports of A-1-A rating—36 in. x 12 ft., cone only $12.00. Same cone with fittings . . **$20.00** « « «



FITTINGS—1. *Shut-off Cock;* 2. *Union Nipple;* 3. *Street Ell;* 4. *Hose Nipple;* 5. *Fuel Line Strainer;* 6. *Plain Cross;* 7. *Pipe Nipple;* 8. *Hose Liner;* 9. *Riveting Flange;* 10. *Union Tee.*

Johnson Tail Wheel



Built to stand the gaff but simple in design and easy to assemble. Three big advantages—(1) Lightest weight on market; (2) Lowest prices; (3) Only tail wheel Timken equipped to take radial or side-load. Two popular sizes, 14 x 3 in. (which also takes 16 x 4 in. tire), and 10 x 3 in. (which also takes 12 x 4 in. tire).

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as a dependable source of supply for everything aeronautical. Dependable in quality, price and service. Strict accordance to government standards. Being both manufacturers and distributors, we can supply your needs in practically every line. Write today for your copy of our big free catalog or send us a trial order—see what Johnson service means!

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Ship me the following items as described in this ad—satisfaction guaranteed or money back:

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Making the airplane Dollar go further

Excess size and weight in automobiles disappeared when automobiles emerged from the luxury into the necessity class, and the automobile industry learned that a car didn't have to be *big* to be good.

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The Davis is a modern plane designed for modern airplane engines. It is built to take two people wherever they want to go, speedily, safely, comfortably—at a minimum cost. And it does it.

The performance data below will show you what the Davis D-1 can do. A flight will reveal to you the rest of the story of how far you can make your airplane dollars go.

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PERFORMANCE *(Actual)*

Type	D1—Le Blond 60	D1-K—Kinner 90
Service Ceiling	10,000 feet	14,000 feet
High Speed	95 M. P. H.	125 M. P. H.
Landing Speed	38 M. P. H.	40 M. P. H.
Cruising Speed	80 M. P. H.	105 M. P. H.
Climb	700 ft. per minute	1200 ft. per minute
Fuel Consumption at Cruising Range	4 1/2 gal. per hour	6 gal. per hour
Cruising Range	300 miles	400 miles
Price Complete, Fly-away	$3285	$4185

Manufactured under
Department of Commerce
Approved Type Certificate

D1

DAVIS
MONOPLANE

"Sold under licenses covering all of the patents owned by members of the Manufacturers Aircraft Association, Inc."

PRODUCTION AND EXPORT

(*Continued from page 70*)

he would automatically be allowed dealer and distribution privileges if he wanted them; but the coöperation he received from the manufacturer likely wouldn't assist him in selling. As might be expected under the circumstances, the man's efforts would usually be rather unorganized. He generally would find it necessary to earn a living in some other line, and this he would do first, trusting to some guardian angel to tell all prospects where he was and what he had to offer.

No general, serious efforts were made to establish dealers in foreign territories until the last few months, but even most of these efforts have not proved immediately fruitful. Individual manufacturers could not afford to spend sufficient money to get quick results. Most dealers in export countries at the present time are in Mexico, where a few branches of American dealers have been established with a fair degree of success.

Though numerous export plans have been suggested, most of them are not at present feasible because of the financial problems involved in carrying them out. The market simply is not yet large enough for an individual manufacturer to enter against competition unless he has many a dollar to spare. Yet the market of at least $5,000,000 worth of airplanes and accessories for 1929-1930 is certainly worth going after, particularly when we consider that this is a conservative figure.

Two outstanding plans have been suggested and are receiving some serious consideration. The first, which involves less chance of individual results, is that of coöperative exporting as suggested and promoted by the Nicholas-Beazley organization, manufacturer of light airplanes. This method entails the coöperative exporting of an allied group in marketing American-made aeronautical products and offers the best chance of meeting the recognized competition of England, France and Germany. The development of the plan may point out the logical way.

But to the individual operator who naturally is out after as much of this business as he can secure, the plan of individual representatives of some kind is more worth while. Financially, he cannot afford to send his own dealers and distributors into every country. He has, however, alternatives that may prove economical and profitable.

He may place his dealer franchises in the hands of importing organizations already established in those countries. There are distinct advantages in that too, as can readily be seen by the fact that these organizations know economic and financial conditions in their respective territories. The trouble is, of course, that the sincerity and initiative of these organizations cannot always be depended upon. This difficulty can be surmounted, but is a factor well worth considering, as past experience in the field has clearly indicated.

Another plan is that of a traveling representative, a man who knows the country or countries in his territory and who knows the markets to cover in a large territory, as modern traveling salesmen do. Here is the biggest opportunity at present and the one that promises reasonable returns at economical expense.

Such individual representatives must have a center of operations, and their equipment must include one or more planes. Which involves a large initial expenditure but one that may be justified. Procedure along this line is, however, one that must be handled with care, not only in the selection of the man for his ability and knowledge of his

(*Continued on next page*)

TWO RECORD PERFORMANCES

Blaze a New Name Across the Nation's Highways

INLAND SPORT MONOPLANE

IN a fully loaded stock model Inland taken off the production line, Lieutenant Willfred G. Moore recently made a new world's speed record for Light Airplanes of the First Category. The plane was the same he had previously flown in establishing a new American Record for altitude.

Moore's plane is a stock model Inland. It was *not* especially designed or built for these trials. It is exactly the kind of ship you would get if you bought an Inland tomorrow. Weighing 850 pounds empty, on the occasion of these trials it carried a load of 330½ pounds, including pilot.

123.17 Miles an Hour

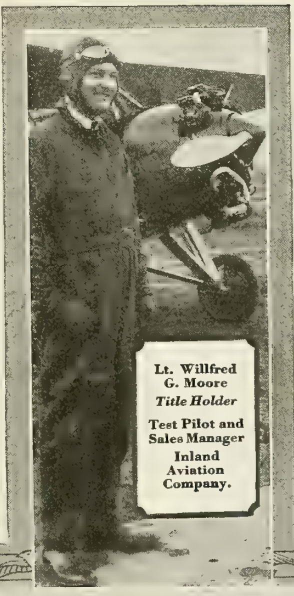
World's Record for Light Planes

On November 4 Lieutenant Moore flew his Inland Sport Monoplane with a Warner Scarab engine over a 100-kilometer closed course in 30 minutes, 12 4-5 seconds . . . at a speed of 123.17 miles an hour. This is 3.31 miles an hour faster than the former record, established in December, 1928, by A. S. Butler, an English flier.

19,659 Feet Altitude

American Record for Light Planes

Previously on October 25, Lieutenant Moore had set a new American light plane record for altitude, by flying the same Inland Sport Monoplane to a height of 19,659 feet. This is only 200 feet from the world's record.



Lt. Willfred G. Moore
Title Holder
Test Pilot and Sales Manager Inland Aviation Company.

THESE two records are official evidence that the Inland has performance far better than the average light airplane.

Inland Sport Monoplanes are manufactured in a fine new factory at Fairfax Airport under Approved Type Certificate No. 259. The Inland is a high wing two-seater monoplane with side-by-side seating arrangement. It is powered with a LeBlond 60 or Warner Scarab engine.

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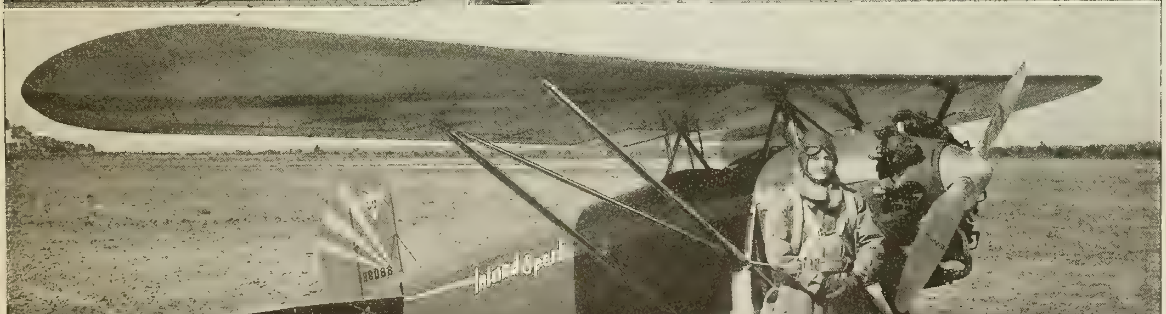
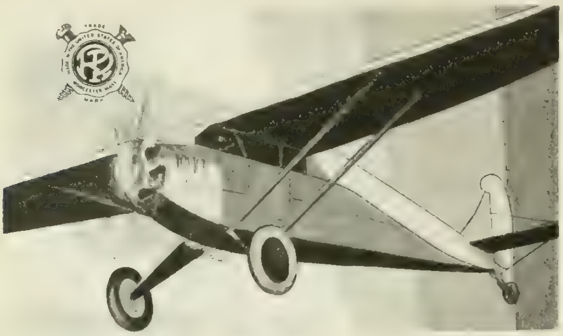
Kansas City, Missouri





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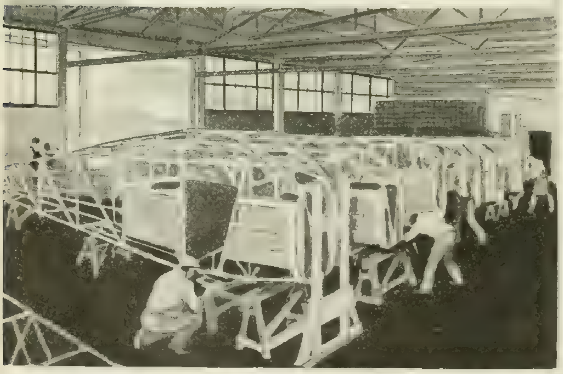

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(*Continued from preceding page*)

territory, but in the establishment of servicing facilities.

The export market offers such a heavy return that it cannot be overlooked, particularly inasmuch as production may necessitate disposal of some units elsewhere than in the domestic market. For a clearer understanding of this let us consider present production.

Aircraft production for 1928 reached a total of $17,194,298, or 3,542 units. For the period January to June, 1929, the total reached 2,854 units, with a value of $17,032,747, figures which almost equalled those of the previous year. The domestic market's consumption is rising but not as fast as the production of aircraft is mounting. This applies for the period a year hence and not for immediate conditions, although it is becoming more apparent every day.

There were 1,850 engines manufactured in 1928 with a total value of $8,936,725. For the first six months of 1929 there were 3,275 units, with a value of $10,923,374. Compared with the airplane production figures, these figures show the increased importance of exporting to engine manufacturers. Their markets are not the same as those of the airplane manufacturers. American engines find a ready market in Europe and Asia, particularly the former. Moreover, engine development has been greater in the United States than elsewhere.

Manufacturers have spent large sums and a good deal of time in production organization and planning. They cannot easily afford to let up on this production once it has been put into full swing, for their heavy investments will not permit it if the ultimate profits are to be realized. Peak production should continue at least two more years before full and justifiable returns have been received on brains and capital invested. There seems to be adequate reason to fear that the domestic market will be unable to consume the output of all factories within that period. There are several manufacturers in full swing at the present time, with the number destined to increase with the advance in organization of other firms and the development of their products.

The warning note is clear. It has already been heard in many an executive office. Planning of export budgets and serious consideration of all possible ways and means of entering foreign market is absolutely necessary if full production at a profit is to continue and if the immense market in dollars and cents that lies in the export field is to be fully realized.

Quantity production demands not only quantity disposal of the product, but also a profitable disposal. It is best that quantity production continues, else hundreds of investments in aeronautical enterprises will strike the rocks. The domestic market has its consumption limits, and when these are reached, there will be no time to turn to the other markets. To turn to them will be to find rivals already entrenched, and firmly entrenched at that. The safe method is to plan now, and this planning should be done immediately. Coöperative or individual, the market is therethe logacil thing is to develop it.

THIS YEAR OF GRACE

(*Continued from page* 54)

of what the well-dressed man will wear, so that the private owner is the season's best prospect. For a fourth, the foreign market is warming up fast for business.

Major Larre-Borges and Lieutenant Challe have just taken an airplane across the south Atlantic to Brazil, this being the sixth time the trick has been done. They spoiled their airplane in putting it down, which is just too bad,

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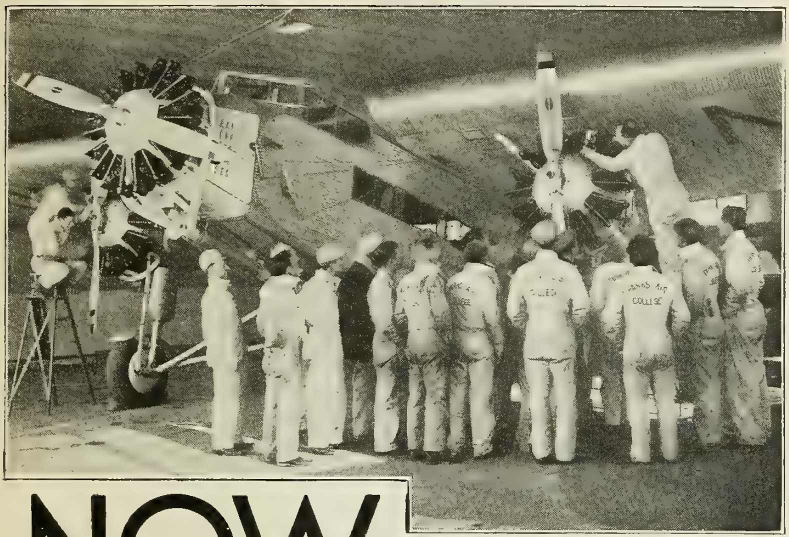

Parks instructor explaining Wasp engine to student group. All Parks airplane and engine mechanics students are given practical instruction on this big tri-motored Ford plane

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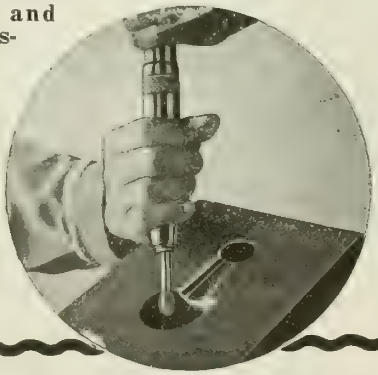

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(*Continued from preceding page*)

but they got safely across and that is really important, particularly to the Major and the Lieutenant. It may be presumed that they made the trip for fame and glory and such small change as might go along with them, but their performance has another significance. The air-minded nations of the world are bidding for South American business. They do so by good-will flights and demonstrations, as well as by F. O. B. and C. O. D. quotations and by the devious dickering which is one way of doing business on the other side of the Canal. Now it is really very comforting to know that American aircraft rate high, wide and handsome south of the Rio Grande, and it is reasonable to expect that this year of grace will prove it with export figures. It's a nice thing to know that one of the world's most promising territories for business, not only in airplanes but in everything else, is nearer to us than to any of our competitors, and that we have won already a share of the gravy. The gentlemen who have airplanes and such to sell have already made a New Year's resolution to get more of it.

In the middle of December the Aero Club of Pennsylvania celebrated its twentieth birthday with a program of honest discussion of aviation's future. Each of the speakers had his little axe to grind, but they managed to agree that 1930 will bring a period of "constructive readjustment," particularly in the field of air transport. Such reaonable and conservative gentlemen as C. Townsend Ludington, Lieutenant Colonel Harry Blee, and Colonel Paul Henderson were willing to admit that passenger transport over long distances is just about three years short of paying a profit, and that it is one thing to build transportation systems and another to persuade the public to ride in them. But, for all this plain speaking, it wasn't a gloomy meeting. The transcontinental lines went on record as expecting a 300 per cent increase in business next spring. The experts promised a "constructive readjustment" of routes and rail connections which would reduce waste and undesirable competition. Even air express got a good word, and a promise that in six or eight months a practical express system would be linked everywhere with surface transportation and would be able to carry a package from here to there without losing it while making change.

All this optimism should mean something to the young army of flying students, most of whom have been chewing their fingers down to the knckles while waiting for the profits of their proficiency to come up to what the prospectus of the flying school promised them. It has been a tough drill for many of them. Aviation looked like a golden door on greased hinges, which would open like a time lock at the end of ten hours' flying in a dual-control job and let the young hopeful into the promised land. But it doesn't work just that way, and most of them know it now and the others will learn. But it is still true and will be truer in 1930 that there are fewer competent pilots than first-class planes, and that the opportunity in aviation is big as all outdoors.

Students and would-be students should paste it in their hat for 1930 that it is as much of a job to get into aviation as into any of the professions which pay as well and have as good chances of advancement. You can make a fair plumber or tree-trimmer or even a bookkeeper in six weeks. But it takes time and money to make a professional pilot, which is why the pilot makes better money than most of the members of the white collar professions. The boys need patience, just as they do in plugging through the post-graduate studies which lead to leadership in other lines

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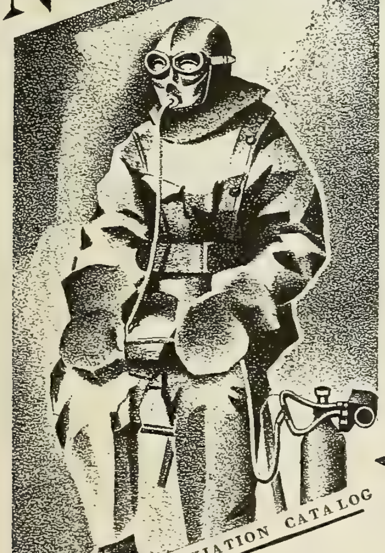
This isn't the Man in the Iron Mask

Nor is this the Man from Mars



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(*Continued from preceding page*)

of expert service. In 1930 there will be a bigger need than ever for men who have taken all the degrees in aviation, and are therefore competent to take a delicate and expensive piece of machinery into the air, loaded with lives that are at least valuable to their owners, and take the whole works where it is supposed to go. Nothing that has happened during 1929 has put the pilot out of business, though marvelous instruments have been developed to help him. And in all the campaign for safety in aviation, nobody has found any substitute for the trained, experienced and resourceful pilot, who can do the thinking which every machine needs to make it more than scrap-iron and blind power.

If anything went a little sour in 1929, it was our optimistic expectations of automatic safety in the air. The "foolproof plane" isn't built yet, and it begins to look as if "there ain't no such animule." Even the autogiro, which is supposed to do everything but collect the tickets and make change, needs to be handled with skill and intelligence, as Harold Pitcairn himself will tell you if he ever gets time to talk to the innocent bystanders. For that matter, it's difficult to see why anybody expects a plane to be designed which will run itself and find it's way home like the family cat. You don't see automobiles running around without drivers, and if you do, you climb a tree. Locomotives need to be coddled and cared for and driven with skill and discretion, even after a century of development. So do ships and wheel-chairs and roller skates. Since so far we haven't developed a fool-proof umbrella or a fool-proof safety-pin or a fool-proof bathtub—not even a fool-proof Senate or Navy Department—we might as well quit talking about the fool-proof airplane. We might even make a New Year resolution to that effect, and see if it doesn't clear the air.

The dear departed Guggenheim Fund put up a brave fight for super-safety, but not a great deal came of it. For that matter, they made the terms of the contest a little steep, just as the rest of us might do if there was $100,000 to shoot at. The contest stimulated the designers a little and aroused the public's curiosity quite a lot, but the principal popular impression, if any, is that when an airplane starts out to demonstrate how safe it is, something happens to it. Perhaps it would be well to change the subject, and give the people something more profitable to think about.

The same still goes for trans-oceanic flights and even for endurance tests. I'm aware that Lieutenant Coste has just flown circles for 5,000 miles or so, which probably proves a number of things including the fact that everything comes to him who waits and keeps trying. But the record of endurance flying since the time when O'Brine and Jackson stayed two weeks away from home is principally one of trouble. And it's amusing to look back at what was said and prophesied two years ago, when a lot of people were willing to admit that Mr. Lindbergh's flight was to be followed by a traffic congestion over the Atlantic which would make the sea below unsafe for anything but submarines. Well, the ships are still running.

Mostly the things we expect never amount to as much as we hope. Mostly the unexpected is what gives us a toehold for progress. But there is a reasonable certainty in the air, an optimistic mood that this will be aviation's banner year, a sense of solid progress so far and swift expansion to come. We have a reasonable right to count on these things, at the beginning of this year of grace. And that, among other things, is what we mean when we wish each other a Happy New Year.

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Curtiss Field at Valley Stream, L. I., showing one of the newly constructed hangars in the background.

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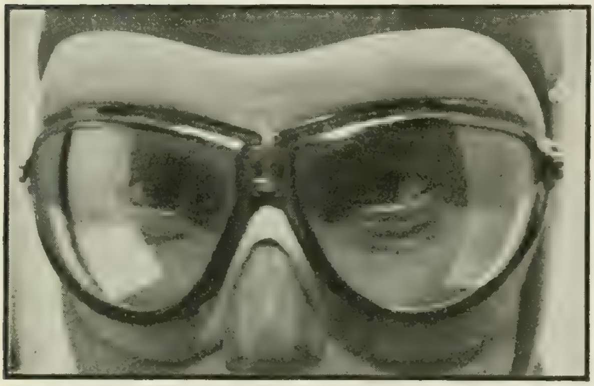

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FINANCING AIRPLANE SALES

(*Continued from page 76*)

the dealer from using the planes for obtaining loans from unsuspecting persons by placarding the premises with signs giving the name of the owner of the planes. The use of the bonded or public warehouse is more agreeable to the finance company. A larger percentage of planes can be stored in public warehouses than on the dealer's floor. The planes can be brought direct to the warehouse and a separate warehouse receipt for each plane issued to the finance company.

Two kinds of warehouse receipts are in use—the negotiable and the non-negotiable. The latter affords greater protection, for the negotiable receipt can be made use of if it is lost or if it gets into the hands of a dishonest dealer. The possession of the plane is not given to the dealer until the amount of the note, for which the warehouse receipt is collateral, is paid up. Thus the finance company is protected by having possession of the planes, and if the dealer does not meet his notes, it can dispose of the planes

As with the trust receipt and the warehouse receipt, the conditional sales agreement provides that title remain with the finance company until the price is paid by the dealer. The finance company secures title the same way it did with the other two forms of security and then resells the machines to the dealer with the conditional sales contract as security. The plane is delivered to the dealer and title is to vest in him at a subsequent time; that is, when he has paid up the wholesale price of the plane less the amount he himself advanced. However, a bona-fide purchaser who does not know about this arrangement can hold possession and title through sanction of the courts, although this agreement is effective against the trustee in bankruptcy and attaching creditors of the dealers. Where a conditional sales contract is required to be filed, it may be possible that even an innocent purchaser would not obtain title.

Under the chattel mortgage arrangement, the finance company loans the dealer the funds with which to pay the draft held by the bank and takes a chattel mortgage for security for the plane that is in the possession of the dealer. This type of security is widely used because it appears to afford the best protection. To make it effective, the mortgage must be recorded. Some dealers object to the use of the chattel mortgage because of the prejudice that recording a chattel loan injures their credit. It is possible that even a recorded chattel mortgage may be unenforceable against a bona-fide purchaser because of the permission given by the dealer to resell.

The lease agreement is a product of foreign jurisprudence used to protect retail sales of goods sold on installments. With some slight variations, it is used to a very limited extent in this country. The United States lives under the English common-law system of jurisprudence, but in civil-law countries such as Italy, Spain and France, the chattel mortgage is rarely heard of—the conditional sales is not familiar and possession under color of sale implies ownership of title. Louisiana still uses the civil law but all the other states use the common law. In civil-law countries, possession is more than nine points of the law. Their principles of the law of sales do not admit of a present sale with title to pass later or to revert back to the seller if the price is not paid. As far as creditors and other third parties are concerned, goods sold under such sale become at once the property of the buyer and can be sold by him at will. In transferring control of the goods the seller transfers title.

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(*Continued on next page*)

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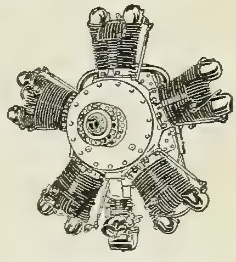

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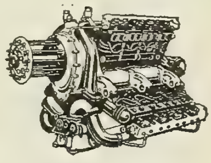

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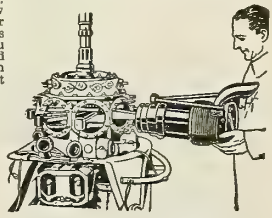

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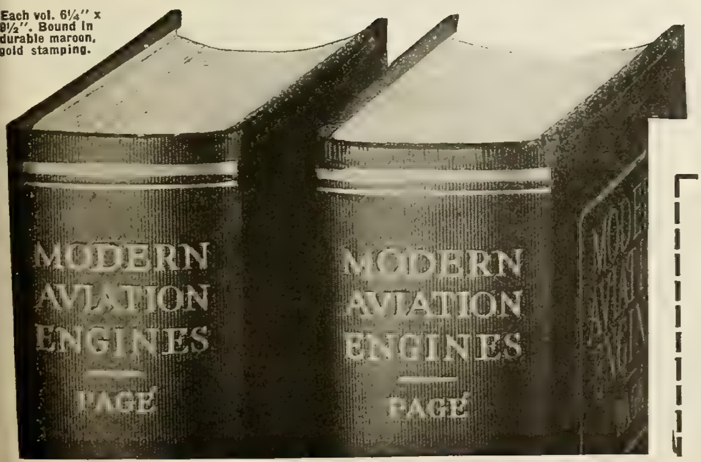

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(*Continued from preceding page*)

there has been evolved a species of contract having the legal effect of a conditional sale and affording all the protection of a recorded chattel mortgage. This is variously termed the hire-purchased contract, the hire and purchase contract, or the lease and sale agreement. In these contracts, title is not to pass till later, the goods being meanwhile held merely on a lease. The leasor or seller covenants in the same or a collateral agreement to convey title upon the completion of a stipulated number of rental payments or to give the holder the option of purchasing the goods later.

Wholesale financing or "dealer financing" is only one of the functions undertaken by the airplane finance company. Retail financing, or "consumer financing," is yet another undertaking of the airplane finance company. When the dealer buys goods from the manufacturer, the manufacturer is assured of his money at once—a small percentage from the dealer and the remainder from the finance company. The same condition applies in the case of retail financing, except that the consumer pays a certain per cent down to the dealer and the finance company pays the dealer the remainder of the sales price of the plane. The dealer receives 100 per cent cash immediately, which includes his full profit on the sale.

The difference between wholesale and retail financing is only one of detail. The element of security enters in the financing of the consumer buyer just as it does in the financing of the dealer's stock from the manufacturer. The primary security of the finance company is evidenced by a lien on the plane in the form of a conditional bill of sale, a lease agreement or a chattel mortgage. The trust receipt and the warehouse receipt are, of course, not adaptable for consumer financing. The form of security used varies in the different states with the conditional sales contract most widely used. Title in the airplane remains with the finance company under both the conditional bill of sale and the lease agreement until the total payments due on the plane have been completed. With the chattel mortgage, title passes at once to the purchaser, but the finance company takes a lien as security.

ASIATIC AVIATION

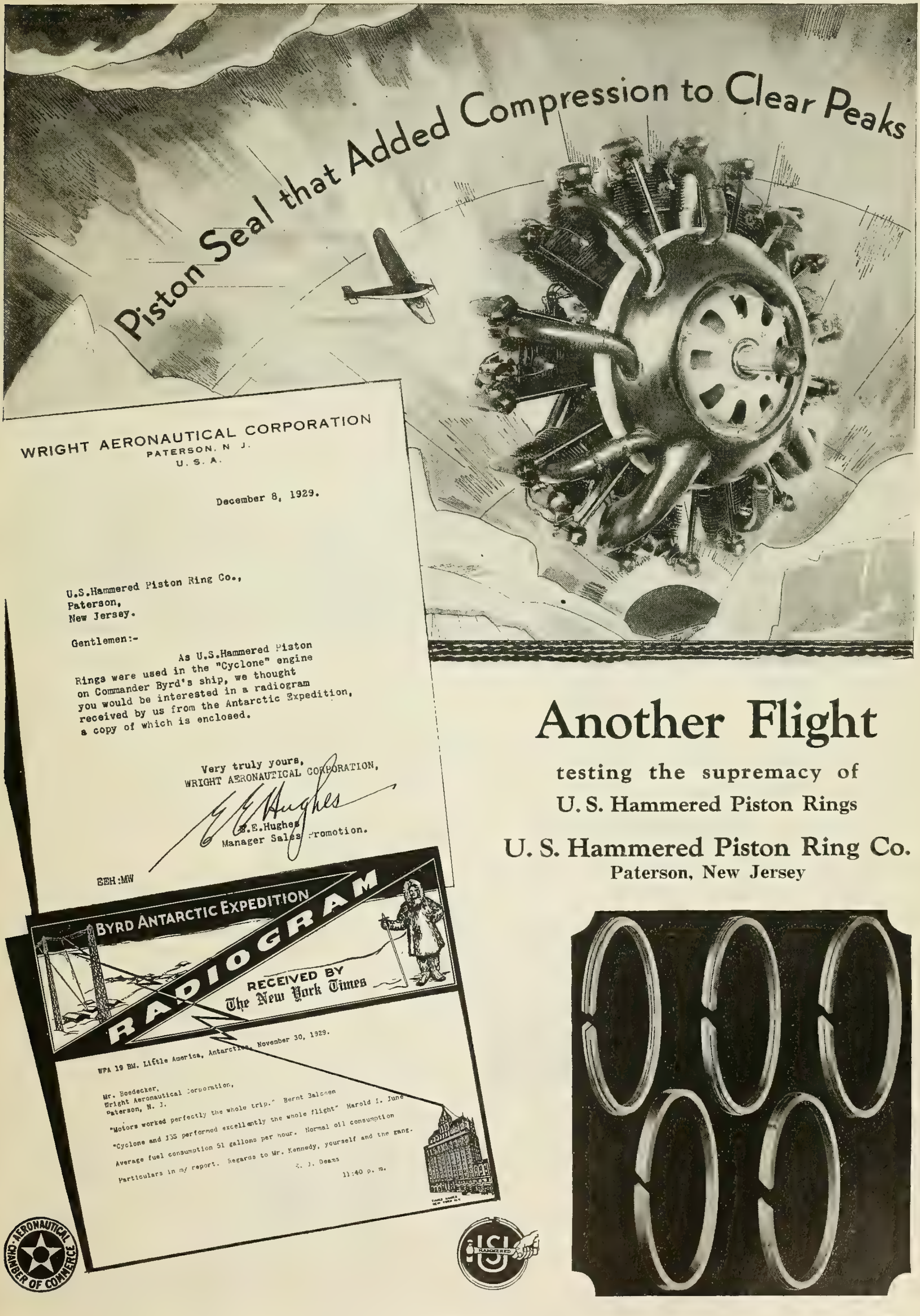
(*Continued from page* 55)

passenger route in the world. The government is behind aviation and is determined to see that routes are established connecting the homeland with its spheres of influence. Japan is doing the only mentionable aeronautical manufacturing in Asia. Her thirteen factories depend almost entirely on military and naval requirements and produce very inferior products. The Kawasaki Dockyard Company, Ltd., manufactures planes, engines and accessories after European design. The Mitsui Company, Ltd., holds license to manufacture Wright engines and has a reputed capacity of 500 planes and 100 engines annually.

Russia's herculean aeronautical program does not ignore Siberia, nor are there many parts of Siberia which have not been provided with air transportation. However, wars in adjacent countries, climatic and other conditions, have contributed to interruptions and discontinuances. Notable are the Berlin to Irkutsk run, including night flying and German coöperation on the western extremity; the Irkutsk-Bodaibo-Yakutsk route into the heart of northern Siberia.

Few should have questioned the development of aeronautics in China since 1909, because in that year the Imperial Court issued an edict for the development of flying. Since then Chinese have flown from Europe to China and around China. Notwithstanding edicts Chinese aviation, like "Chinese anything else," has a rough, wind-

(*Continued on next page*)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(Continued from preceding page)

ing road. Factories, mail service, and schools have been born, but diseases of war, insurrection, apathy, and finance have resulted in untimely deaths. Shipments of military planes have rotted in warehouses after extra money was expended to expedite their shipment; elaborate plans have been evolved, partly executed, and then abandoned for more elaborate ones, in turn only partly executed.

The Chinese have produced about a dozen planes in their three factories at Shanghai, Pagoda Anchorage in Fukien, and Canton. No engine manufacturing is expected because of the absence of mixed metals.

In the past Japanese, French, German, and Russian fliers have assisted in the aerial phases of Chinese wars. Now two American companies are assisting in the establishment of airplanes. American Aviation Exploration, Inc. (Curtiss subsidiary) has an indirect contract with the government through the China National Aviation Corporation. The former agrees to extend credit to the extent of $2,000,000 to operate a minimum of 3,000 miles daily at rates ranging from $1.50 to $4.50 per plane mile, depending upon the size of the ship. It also has options to engage in manufacture and all usual branches of commercial aviation. The National Aviation Corporation agrees to prepare the routes and handle a few other details. Stinson interests have also made arrangements to carry mail and passengers. Both these American groups have had organizers, pilots, mechanics, and equipment running and flying around China since last spring. The first round trip mail flight was made between Shanghai and Nanking last July, and since then the same service and others have been inaugurated and re-inaugurated. However, if one of those many things that generally happen in China does not happen, reliable service may be expected on such routes as Shanghai-Hankow; Nanking-Canton; Nanking-Peiping; Hankow-Canton.

At present the Dutch and English account for most of Asia's reliable airways; the Japanese are responsible for the greater part of the balance. The southern triumvirate is developing difficult and extensive routes, and with their completion France and England will have time to look toward the north at their Chinese spheres of influence.

All aviation is heavily subsidized. The Chinese arrangements may not be called a subsidy, but the name is not important. The colonisers are going to bring their remote lands closer at almost any cost.

Considering only operating routes, it seems that air transportation is proportionately ahead of roads, electrification projects—in fact, ahead of Asia. Certainly this year should not bring forth more airlines than appear on the accompanying map, which includes only feasible projects already under way and ignores many unsound, over-ambitious schemes even where preliminaries have been initiated. Judging from several seriously attempted projects, some people hear the cries of lands lacking modern transportation, but fail to hear the whisperings emanating from inadequate development and accessible but untouched resources. Can a country unable to maintain roads, railroads and shipping facilities support expensive aviation? The air is at present primarily a trade stimulant, not a trade-carrier; only prosperous countries or those having furs and gold lying on ground unattainable by other means of transportation can give aviation an adequate return. When freight-car loadings, gas consumption, and ship cargoes are heavy, aircraft will make them heavier. The naturally accessible country using four or even two-legged means of transportation needs only sufficient winged propellers to move small amounts of bank and commercial paper and a few of its executives.

(Continued on next page)

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(*Continued from preceding page*)

Although Asia does not offer any opportunity to build up a Boeing System, it is holding out two prospects to the American aviation industry: a market in Japan and China and training schools in the latter. The Japanese market and the Chinese training will soon lose importance; the Japanese will quickly duplicate foreign manufactures, and the Chinese will have sufficient pilots.

Present market conditions in the Orient present some interesting aspects. Trading firms without a few plane agencies are scarce; some small houses have five and six agencies, American and European mixed. On the remotest prospects of one sale, manufacturers and distributors from Berlin to Los Angeles are answering Asiatic communications.

The American manufacturer has important advantages which he should strive to hold in his only permanent Asiatic market. Chinese have been agreeably surprised with the American speed of delivery versus the three to five months' wait following European orders. The obsolescent post-war European equipment sent to China needs no comment, while the carelessness of inspection of even new equipment permitted the slipping through of such things as engines with over-size pistons. In short, Europe's aeronautical goodwill in China is not very valuable. The biggest asset is the American training of Chinese pilots. Most of the active ones were trained in the States or received their instruction from pilots who studied there. The only plane that can compare with the one on which we trained is another made by the same or a similar company. China is very prejudiced about the Ryan, because of Lindbergh; the Stinson-Detroiter, because Schlee and Brock flew it from home to their backyards; Waco and Curtiss planes, their first loves. All of these planes have had active representation in China.

In Japan, American and European products are about on a par. Though the Japanese are manufacturing American engines and seem recently to have acquired a preference for American equipment, they are also producing European designs. Moreover, the Japanese seem to think more in European than American terms; when comparing something native with a foreign item, they will more frequently choose from Europe.

All Asia imported twenty-eight planes from the United States during the first six months of 1929, and China and Japan took twenty-four of these. This equals approximately fourteen per cent of the total of 199 planes exported for the period; whereas during 1928 Asia took only eleven per cent of our exports after leaving Canada, the big buyer for the period, out of the picture. After the Americas, China and Japan are our next and only customers.

EXCHANGE CLUBS AID AVIATION

(*Continued from page* 81)

our major activity, with a broadening of the program, the convention appointed a special aviation committee composed of Lieut. Walter Hinton, Colonel Harold E. Hartney, Walter W. Hubbard, Dr. John E. Stoddard, and the president of the National Exchange Club, to promote the interests of aviation nationally with an advisory board of experts and authorities in various phases of the industry to assist in developing plans. That Committee has already begun work, and the advisory board is in the process of formation.

Our purpose, of course, is not to intrude our own ideas or impose them upon others, but to find out what aviation needs most and what is the best service we can render.

Creation of a national system of airways, definitely

(*Continued on next page*)

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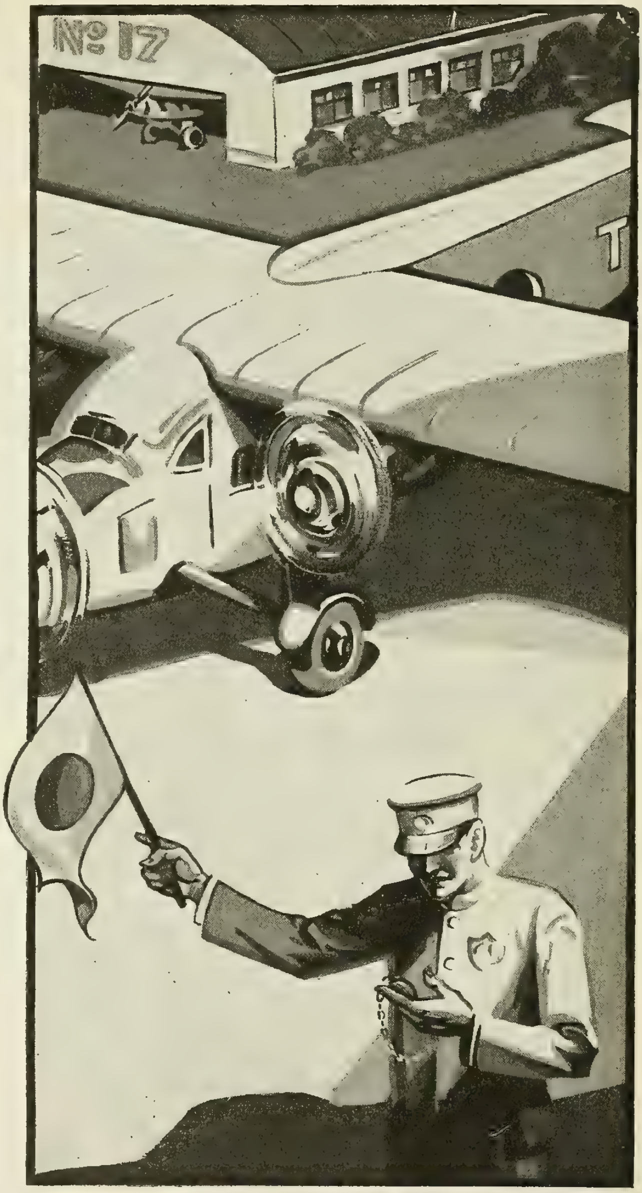

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(*Continued from preceding page*)

mapped and charted by the United States Government, covering not only existing lines, but all the routes required or a comprehensive network of airlines covering the entire country, appears to us one of the most important things that can be done. This will be a chart and guide pointing to the future, enabling each locality to move forward in developing its air service along logical, effective lines.

Towers and beacons to guide aviators day and night are necessary to make safe, permanent airways and we will bend our efforts to further their erection. Intermediate landing fields are greatly needed in many sections. Government authorities favor their establishment every thirty miles, we understand, which means that eventually the land will be dotted with them. Exchange Clubs have already established a number of such fields, and will create many more.

No state or local regulations can control planes which can cross the continent from dawn to dusk and fly over 20 states in a day. Federal licensing and regulation are, therefore, favored. Twenty states now require Federal licenses. All should do so. Aviation is essentially interstate. It has become a national activity and should be so recognized. The Exchange Clubs will give their warmest support to the efforts of Federal and state governments in their efforts for its development.

The air must be made safe for aviators and passengers, and the ground be made safe from the aviator. We are seeking, wherever possible, to provide lights, markers and other safety devices. In fact, two projects to which we will devote particular attention during the coming year are: The marking of towns and highways in accordance with Federal standards; and the painting of roofs of railroad stations and other conspicuous buildings with the names of towns, the direction and distance of the nearest landing fields and other marks to guide aircraft. Marking highways and junction points, authorities tell us, will be of vital service to aviators in general. Towns and localities can do that at small expense. The highway commissions in each state can put it into effect within their own borders. Our aviation committee, of which Lieut. Hinton is chairman, is starting a movement to bring this matter to the attention of state and local authorities throughout the Union. Exchange Clubs everywhere will, we may be sure, take up this work with characteristic vigor and enthusiasm. Within another year thousands of miles of highways can be marked by our members, offering useful guides for fliers.

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In developing commercial aviation or public service, we are also helping create a mighty arm of national defense. With thousands of planes, manned by skilled aviators, with airways stretching from the Atlantic to the Pacific, from Canada to Mexico, armies can be moved swiftly from coast to coast, troops thrown promptly into any section that is threatened. Oceans can be patrolled, merchant ships and food carriers escorted. We can have an army and navy of the air able to repulse any foe that attempts to set foot upon our soil.

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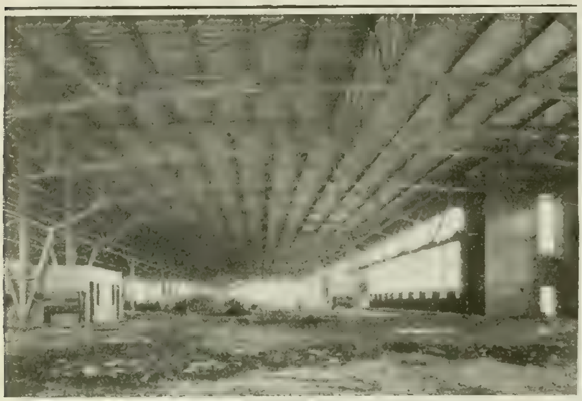

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INTRODUCING AMERICAN AIRCRAFT

(*Continued from page 67*)

United States Department of State had imposed an embargo against the export of American planes to China, believing that all planes would be used in civil war.

Despite these seemingly insurmountable handicaps, the Ryan Aircraft Corporation believed in the possibilities aviation held for the development of the country, and sent to China a factory representative who was already well versed in the Chinese methods of doing business. In coöperation with one of the leading Chinese import houses, he started a campaign of education among government officials, proving to them that their past failures had been due to poor equipment and inexperienced pilots and mechanics. At the same time, efforts were begun to have the State Department remove the embargo; which was shortly raised.

The company's representative in China obtained the interest of General Chang Wei Chang, one of the younger, more progressive officials of Southern Nationalist government, who placed an order for a Ryan Brougham, the first modern plane in that country. The performance of the plane convinced him that aviation offered the one hope of developing the resources of the country, with the result that he started a one-man campaign of education of his people.

His flights covering over 4,000 miles, and including nearly every large city in the country, created so much enthusiasm that he shortly became known as the "Lindbergh of the East." These flights were undertaken with no prepared landing fields available anywhere, few placed where high test gasoline could be obtained, and with no facilities anywhere for making major repairs. The fact that these flights were made with scarcely any forced landings, and without any damage to the plane, is a remarkable tribute both to the piloting ability of General Chang and to the performance of the Ryan plane.

Purchases of Ryan Broughams by the government followed with such rapidity that, in less than two years, planes valued at $135,000 had been sold. Five of these are now being used on an air transport line running between Canton and Hankow.

With the missionary work accomplished, the sale of many other American planes followed; the government has established an excellent aviation school; plans are being made for the establishment of other air transport lines, and landing fields and servicing facilities are rapidly being prepared in all parts of the country.

Since the factory must be prepared to cope with adjustments which are sometimes necessary, the Ryan policy has always been to give the purchaser the benefit of any doubt. In many cases crack-ups are caused by lack of experience, so that the training of pilots and mechanics is regarded as an essential part of the sales.

In foreign sales work, graphic representations of the product have far more influence than the usual literature used in this country. Motion pictures particularly are useful, colored catalogues, and large action pictures are also valuable. In many instances, Ryans have been sold by these means without the purchaser's ever having seen the plane. The reputation of the plane and the company making it have a great influence on sales. Foreign purchasers have gotten the short end of so many aviation deals that they are becoming suspicious of any planes or engines which have not achieved an international reputation.

American manufacturers will run against heavy competition from European companies in any foreign market, many companies having had for many years agencies in

(*Continued on next page*)

Proper Design Is the Key to This Economy

Bunting Quality Bronze Bearings Assure

- Maximum bearing life.
- Simplified mechanical design.
- Low first cost.
- Quietness of operation.
- Low assembly cost.
- Ease and economy of replacement.
- Insurance against costly results of bearing failure.

BECAUSE of the outstanding importance of the bearing some machinery manufacturers have deliberately chosen the most costly types of bearings, and types which entail excessive installation, assembling and maintenance costs.

Many of these manufacturers thought that they had exhausted the possibility of the bronze bearing, which type for various conspicuous reasons they recognize as much more satisfactory than any other in many ways.

Every day we are showing these machinery manufacturers that proper design and composition make the far less costly bronze bearing much more desirable than any other kind, and that through proper design and quality all the many valuable advantages of bronze bearings can be economically included in their products.

This organization brings to the great new aviation industry knowledge gained in years of experience in all mechanical industries, and the new facts produced in constant research and experiment. We are capably serving many leading airplane manufacturers today. We will gladly discuss your requirements of bearings and bronze parts.

THE BUNTING BRASS & BRONZE CO.
Toledo, Ohio

BRANCHES AND WAREHOUSES AT
NEW YORK CHICAGO BOSTON
PHILADELPHIA SAN FRANCISCO

EXPORT OFFICE
TOLEDO, OHIO

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QUALITY
PHOSPHOR BRONZE
BUSHING BEARINGS
PATENTED

Universal Schools provide safe, thorough instruction to quality student for examination for private, limited commercial or transport pilot's license.

Learn the Way
to get started in Aviation

GET a true picture of this rapidly developing industry. See the opportunities it offers young men. Clip the coupon and mail for your free copy of the book "Aviation — What It Means To You." Read in this book the thoroughness with which students in Universal Aviation Schools are trained as Aviation Mechanics and Pilots. See why flying training will place you at a big advantage although you may engage in one of the many other lines of aeronautical work. Familiarize yourself with the various aeronautical terms as explained here. This book is interestingly written, truthful in all respects, full of illustrations and honestly helpful to you in planning a way to enter this field of big, new opportunities. Send for your copy — FREE — today.

Ray Kutterer a Universal student who now holds a responsible position with the Universal Aviation Corporation.

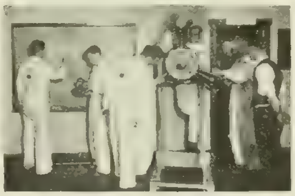
Graduates of the Universal Aviation Welding Course are always in demand

Background of Universal Aviation Schools

Universal Aviation Schools form a national system, individual schools being located in a number of key cities and all schools offering the same courses and high type of training. These schools are owned and directed by the Universal Aviation Corporation, a concern which, with its affiliated lines, covers over 17,500 miles of airways a day carrying air mail, express and passengers. Having the tremendous resources of the Universal Aviation Corporation behind them, the schools have been provided with the finest equipment obtainable and the most competent instructors in the country.

Insurance Provided for Universal Flight Students

Only new production, government licensed planes and thoroughly experienced government licensed transport pilots are employed in Universal flying training. The remarkable safety of Universal training is shown by the fact that Universal flight students were the first to be offered complete insurance protection throughout their training by an established insurance firm. This insurance assists you in securing financial backing to learn to fly. Full details are explained in the book "Aviation — What It Means To You." Mail coupon for your copy.



Universal students taking the Aviation Mechanic's Course work on all types of motors including latest air cooled makes

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A Division of The Aviation Corporation

Universal Schools inspected and rated by U. S. Dept. of Commerce

A class of students taking the Aviation Business Course

Member

UNIVERSAL AVIATION SCHOOLS
1048-57 Boatmen's Bk. Bldg.
St. Louis, Mo.

Please send me at once your free book "Aviation — What It Means To You." I am interested in: ( ) Flying Course
( ) Aviation Mechanic's Course ( ) Business Course
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(Continued from preceding page)

the leading countries of South America and elsewhere. On the whole, however, the American reputation for fair dealing, standardization, and quick shipment of replacement parts, as well as the performance of the planes, has resulted in a decided preference for American products. Nevertheless, if any manufacturer is to obtain any foothold in the export field, it is necessary that he have a plane which is suitable for operation in these countries, and that the sales work be placed in charge of men who have a thorough knowledge of the conditions in the countries in which they are working.

AIR—HOT AND OTHERWISE

(Continued from page 64)

With every gain of strength the value of the aircraft industry to the Government will automatically and geometrically increase. We ask the industry to make concerted effort to impress these facts on Washington officials. Now is the time to do it. If Congress can be educated to conditions in the industry as a whole and not be misled by individual companies looking for small orders which will just fill the gaps in single bank-rolls, Congress will respond.

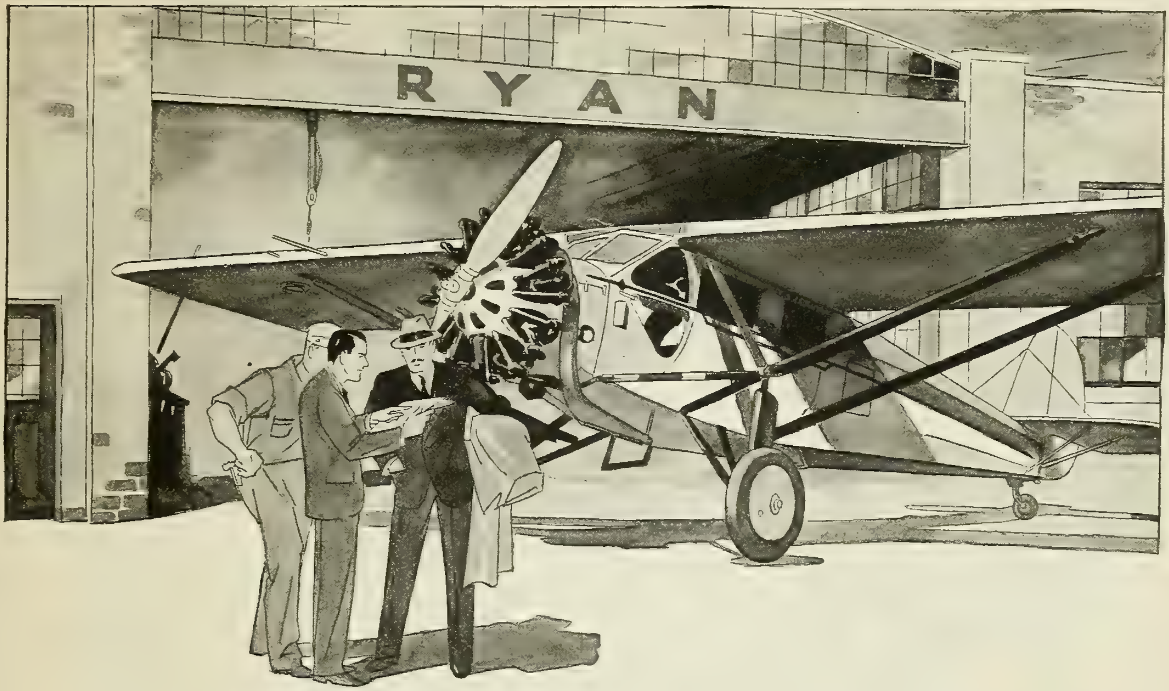
The President asked the leaders of the industry to meet in conference in Washington. They met. And they are hustling as he asked. It is now wholly fair to ask him to see to it that they get the business Congress promised them, a request particularly reasonable because their getting it will help the general situation in which he naturally is so vitally concerned.

WE think this air mail tangle is one of those things which sometimes happen because grown men have childish moments. If some who think they are great lobbyists for the time being would lay off the situation as it stands in Washington and await the conference which will take up the whole affair of air mail contracts, operation and general procedure, they would be waiting calmly for what we believe will be a glad surprise, providing their interests really are those of the whole industry. Months ago we remarked that the Wise Man On the Hill would at the right time undoubtedly take this whole snarled skein into his own hands and out of those who had entangled it, that he would straighten it out, and that from its fibres he would knit a fabric which would survive upon the basis of real merit, with no thread of political pull interwoven either in its web or woof.

Perhaps some air mail operators may remember this. If not, perhaps, re-reading it, they will have wit enough to file it in their memories now for future reference. There has been far too much politics in the awarding of air mail contracts, too many fights waged by contractors who have sought to hold what they have reckoned juicy contracts, with, in most instances, not enough honest-to-goodness effort to develop real air transport lines.

We do not now believe the President has any thought of permitting a decrease in our air mail facilities. Often he has evidenced real friendliness; he became more honestly air-minded in remote World War days than many of the men who now shout most loudly of their great enthusiasm.

(Continued on next page)



Another step in leadership—

standardized service for all Ryan Owners

By inaugurating a "flat-rate" service system, Ryan again brings to airplane ownership a new and striking economy. Now, Ryan owners can learn the exact cost of any repair operation—before the work is undertaken.

Patterned after the system which has proved so successful in the automotive industry, Ryan's chart of standardized service charges is based on the actual labor and materials involved. From the installation of new control wires to recovering the entire ship, definite data is available in advance. By eliminating guesswork, Ryan has reduced maintenance charges to a minimum.

Ryan has also provided for the demand for replacement parts of models out of production. An adequate supply is kept in stock for every type of Ryan ever built so that Ryan owners are saved the delay and expense of having parts made to special order.

In manufacturing and selling airplanes, Ryan has fully accepted the responsibilities of servicing its product in the hands of owners—of keeping Ryan planes in the air. The new "flat-rate" service system represents another reason for the complete and continued satisfaction of Ryan owners throughout the country.

BUILDERS OF LINDBERGH'S "SPIRIT OF ST. LOUIS"

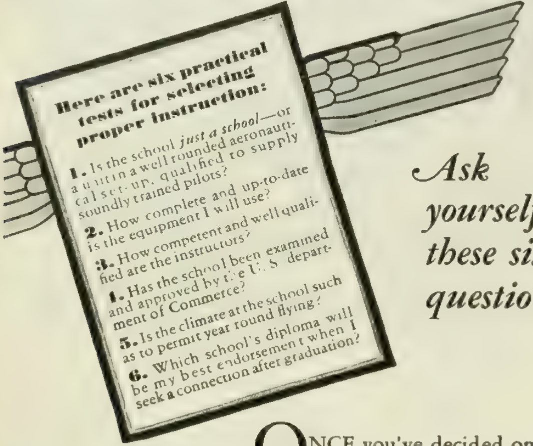
DETROIT AIRCRAFT

UNION TRUST BUILDING, DETROIT

WESTERN OFFICE: ROOSEVELT BUILDING, LOS ANGELES

RYAN AIRCRAFT CORPORATION
LOCKHEED AIRCRAFT CORPORATION
PARKS AIR COLLEGE, INCORPORATED
AIRCRAFT PARTS COMPANY, INCORPORATED
PARKS AIRCRAFT CORPORATION
EASTMAN AIRCRAFT CORPORATION
BLACKBURN AIRCRAFT CORPORATION
AIRCRAFT DEVELOPMENT CORPORATION
MARINE AIRCRAFT CORPORATION
GROSSE ILE AIRPORT, INCORPORATED
GLIDERS, INCORPORATED
DETROIT AIRCRAFT EXPORT CORPORATION

GOING IN for FLYING?



Here are six practical tests for selecting proper instruction:

1. Is the school *just a school*—or a unit in a well rounded aeronautical set-up, qualified to supply soundly trained pilots?
2. How complete and up-to-date is the equipment I will use?
3. How competent and well qualified are the instructors?
4. Has the school been examined and approved by the U. S. department of Commerce?
5. Is the climate at the school such as to permit year round flying?
6. Which school's diploma will be my best endorsement when I seek a connection after graduation?

Ask yourself these six questions!

ONCE you've decided on an aeronautical career, your next big problem is: *"How shall I prepare myself; where can I obtain the important training that will best equip me for later development?"*

Back of the Boeing School of Aeronautics (Dept. of Commerce approved school) are the 8,000,000 miles flown by Boeing system planes—the men who *built* these planes—and the men who *fly* them. And behind the *Boeing Company* are the international resources and equipment of the United Aircraft and Transport Corporation.

Experience—not just theory—forms the background for every Boeing-taught course. And Boeing instructors are seasoned pilots—men like George Myers, veteran of the air mail since 1923, with 5000 hours night and day flying to his credit. Four Boeing flying instructors have had a total of 22,000 hours flying experience, military, air mail and commercial.

Advanced training makes a competent pilot. Don't just "pick up" flying. Choose your school with an eye to your future. Check both ground school and flying courses. By these tests Boeing training is a sound investment. And Oakland's mild winter climate assures you ideal flying weather at times when students of less fortunately located schools must remain indoors!

New classes form quarterly. Mail coupon below or write us in detail about your plans for an aeronautical career.

BOEING SCHOOL of AERONAUTICS
Division of United Aircraft and Transport Corporation
Airport · Oakland · California

I am interested in the Boeing School of Aeronautics' course I have checked:

☐ Private Pilot
35 hrs. ground school. In air, 10 hrs. dual, 8 hrs. solo.
☐ Transport Pilot
140 hrs. ground school. In air, 50 hrs. dual, 150 hrs. solo
☐ Limited Commercial
70 hrs. ground school. In air, 25 hrs. dual, 25 hrs. solo.
☐ Master Mechanic
Training for operations and manufacturing, 22 subjects. 1008 hrs. (lecture-shop).
☐ Master Pilot Ground School
Includes subjects given only in universities. 864 hrs. (lecture-shop). 22 subjects.
☐ Special Master Pilot
Big plane flying. Open to Transport License holders.
☐ Airplane and Engine Mechanic
140 hrs. in lecture, laboratory and shop.

Name and Street Address

City and State

AD-130

(*Continued from preceding page*)

It is our personal belief that the Postmaster General will ask of the present Congress legislation which will provide entirely new and positively fair, even definitely attractive, methods for paying for air mail transport.

In the past we have heard many say that air mail transport would lead the way to air passenger development, but time has shown that conversation of this sort, emitting from the lips of contractors, has been principally bunk—words, idle words. The majority of air mail contracts have not tried to spread the thought of air passenger traffic or to create and get such business. If the Government really desires development of air passenger traffic, and the Government desires exactly that, beyond a doubt, it knows that it cannot accomplish that which it desires without coöperation from the operators.

That the United States should lag behind the other progressive nations of the world in this detail of development is an absurdity. We are willing here and now to bet one of Mr. Mellon's smallest, newest, most effective dollar bills, we are willing (even) solemnly to wager a diamond back terrapin dinner down in Washington against a hot dog lunch in Hoboken that the legislation, when it comes, will insist on the development of real air passenger traffic by those to whom the privilege of carrying air mail is granted, and that no contractor who honestly has tried really to develop national airways for the benefit of those who wish to fly as passengers, will find himself dismayed when the President gets through.

The men who have been flying mail for the money they could get from it, and for no other reason, may take a hint from this suggestion, meantime removing from above their doors the motto which they may have nailed there reading: "There IS a Santa Claus" and substituting for it one which reads: "This nation has a PRESIDENT who is definitely on the job."

AFTER about three months' discussion between the Aeronautical Chamber of Commerce and American Legion Aviators' Post 743, the Chamber through its show committee has decided that coöperation with the Legion and a merging of their show interests cannot be brought about. This is bad for everyone concerned. It will bear heavily on the resources of all those who feel that their business interests require that they should participate in both shows if two are to be held. The Legion will hold its show in February, and present indications that it will be a success equal to that of its previous gratifying exposition.

While on this subject we may rise and cry aloud that there are too many shows. Not all are productive of increased business. It is about time that the industry, relieved of the show-strain, had a chance to devote attention to legitimate merchandising of its products. Some of the executives of the Chamber might give some thought to this. The December show in Chicago last year made a little money, but the industry has been more or less hi-jacked for additional funds by some of the other shows. If more attention were paid by the Chamber to problems really worth while, the industry would benefit, and through its prosperity the Chamber itself would gain. It is to be hoped that the officers about to be elected will make an effort to curb the show spirit during the next couple of years, devoting the time which shows might otherwise absorb to making plans for merchandising its existing products through publicity campaigns that will educate the potential buying public to the advisability of using aircraft.

DALLAS AVIATION SCHOOL AND AIR COLLEGE

Wise Birds Fly South in the Winter—
Take your Cue from them

OUR STUDENTS PASS THE TESTS

Because of everyday training and instruction by the right methods and ideal weather conditions.

NO BOND

required of our students for breakage of equipment during instruction. Students are not held responsible for same.

BOARD AND ROOM

Right on the field with every city convenience and comfort at $8 to $10 per week—Means a big saving to you.

CITY OF DALLAS

Is only a short distance from the airport and regular bus transportation is available at all times.

We have recently enlarged our hangar, shop and class room space and we now have more than 50,000 square feet devoted exclusively to school purposes and equipment.

OUR PRICES

Why Pay More?

Private Pilot's Course
20 air hours—dual and solo instruction, qualifying student for government examination.
Ground School instruction included.
About four weeks time to complete $385

Commercial Course
50 air hours, dual and solo instruction. Everything in flying, cross country trips, acrobatics, night flying. Complete course in Mechanics and Ground School. Open and cabin ships. 60 to 70 days time $795

Transport Course 6 to 7 months
200 air hours, dual and solo instruction in two and three place open ships and three to six place cabin ships. Complete courses in everything in aviation. Air Navigation and Meterology. Qualifies for Transport license. Position positively guaranteed as soon as license is secured with this course. $2,500

3 Months Ground School Course
Motor Mechanics, class instruction $100

Special Training Prices

10 Air Hours—dual and solo flying	$180
15 Air Hours—dual and advanced flying	295
10 Air Hours—3-place cabin instruction	250
10 Air Hours—6-place cabin instruction	350

Ten Years Safe, Sane Flying

EQUIPMENT

Is all practically new and up-to-date and licensed, two and three place open ships and three and six place cabin ships used in training. Best fleet of training planes in the country.

INSTRUCTORS

All licensed and experienced. Each student given personal instruction. You can start flying on your arrival here. No waiting. We are always ready for you.

OUR PROPOSITION

The best in the entire country. We want to get a chance to tell you about it. Write or wire for our new catalog.

We will pay your Railroad fare from your home to Dallas.
Write for our new catalog and full information.

DALLAS AVIATION SCHOOL AND AIR COLLEGE

DALLAS, TEXAS

Complete courses in aviation *Reference: Mercantile Bank and Trust Co.*

Where Screws Get A Real Test

The Dyer Motorcraft — a rough water speed runabout—is capable of running all season in heavy weather.

Naturally such heavy weather performance is only possible in a hull that is properly designed and constructed of the best materials to withstand constant pounding into the waves.

There are 4819 American Screws in the planking of a Dyer Motorcraft. They are selected to do this job because they stand the strain of rough treatment.

MADE IN THE UNITED STATES OF AMERICA 1838

You can do any job better with American Screws

TIRE BOLTS WOOD SCREWS STOVE BOLTS MACHINE SCREWS

AMERICAN SCREW CO.
PROVIDENCE, R.I., U.S.A.
WESTERN DEPOT, 225 WEST RANDOLPH ST., CHICAGO, ILL.
"Put It Together With Screws"

EXPORT MARKET CONDTIONS

(*Continued from page* 68)

Central and South America have been mentioned briefly, but there are other vast territories equally important. Africa, India, Australia and the Near East offer fields as interesting and as lucrative as the others.

The exports of automotive products from the United States, with a total value amounting to over $450,000,000 annually, have reached third among products exported from this country. They are exceeded only by mineral oils and cotton. Excluding Italy, France, Germany and England, which countries supply the greater portion of their own domestic demand, three out of every four motor cars registered in the world are of American manufacture. Without question, the United States has obtained the dominant position in the overseas market for this mode of transportation.

But let us consider the export of aircraft and allied products. During the years 1925, 1926 and 1927, the United States exported $3,317,000 worth of planes, parts and accessories. In 1928 the value of aeronautical products exported exceeded this total. But though we pride ourselves on the remarkable increase, of which about half went to Canada, the combined exports of France and England for 1928 totaled over $15,000,000.

There are 110 countries in which American motor cars are sold. Each presents an interesting prospect for the sale of American planes. Yet it is typically true of American business, especially in a new industry, that either through lack of foresight or the pressing domestic demand, the manufacturer does not readily grasp the opportunity offered by overseas markets, and has allowed the European, trained in overseas merchandising, to gain a tremendous foothold.

The aviation industry today is not in the same favorable position that the automotive was when it obtained its initial foothold abroad. There is no post-war condition rendering American factories the only source of supply. We Americans are rather inclined, because of the success of our motor cars abroad, to be overbearing in what we consider our ability to capture a world market for any or all similar products. Because the American traveler, when he was spending freely, has received a cordial reception at cafes in Berlin and Paris and at the night clubs of London, he need not conclude that the responsible business men of those countries do not feel and resent the inroads made by American manufacturers on the world trade. They do, and are more than ever awake to the necessity of making a determined effort in the overseas market. For example consider, the combination of the French, German and Belgian steel industries to combat the inroads made by the Americans.

Each country is different. Every export order is a study in itself. The distribution systems vary. The American manufacturer who feels that the overseas markets are excellent places to dump his surplus products is not only a detriment to his own industry but to other industries which are seriously attempting to develop the markets.

Aviation is new. It is new in this country but much more so overseas. We cannot take our aeronautical products to the foreigner, dump them at his door step, describe briefly how successfully they are being used in this country

(*Continued on next page*)

THE KenRoyce

—By REARWIN

SPECIFICATIONS

Dimensions: Overall length, 25 ft. Maximum height, 9 ft. Overall span, 35 ft. Total wing area, 300 ft.

Construction: Fuselage, welded Chrome Molybdenum and Carbon steel tubing.

Wings: Spars of laminated spruce. Ribs, spruce and basswood. Leading edge of formed spruce and birch plywood. Trailing edge duralumimum. Wing tips of steel tubing. Fabric covered.

Tail surfaces: Welded steel channels and tubing.

Landing gears: Bendix wheels and brakes. Special Rearwin shock absorbers.

Ailerons: Freize upper wing only.

Controls: All internal, no pulleys.

Power plant: Curtiss Challenger 170 h.p. and Wright J6-5 225 h.p.

Fuel data: Gasoline, upper 22 gal., lower 33 gal. Oil 6 gal.

Equipment: Pioneer instruments. Navigation lights. Tail skid or wheel. Special shock absorbers. Starter.

Load: Weight, empty, 1,465 lbs. Useful load, 885 lbs. Pay load, 374 lbs. Gross, 2,350 lbs.

THE ultimate in fine Aircraft . . . a thoroughbred in every particular. Winner of scores of competitive contests, including the Miami-Cleveland Air Derby, National Air Races 1929. Staunch in structure . . . trim in line . . . made of finest materials . . . the KEN-ROYCE delights the eye of the keenest observer. Engineered with exacting precision . . . superb in performance . . . it unfailingly wins the spontaneous approval of those who fly it.

KEN-ROYCE PERFORMANCE

Tests for the following were made with the same propeller pitch and no wind. All comparisons are made in reference to Airplanes of the same class and horsepower.

TAKE-OFF: The KEN-ROYCE takes off quickly and in a very short space. Time, 5½ sec.

RATE OF CLIMB: The KEN-ROYCE will climb 10,000 ft. in 17 min. and 15 sec.

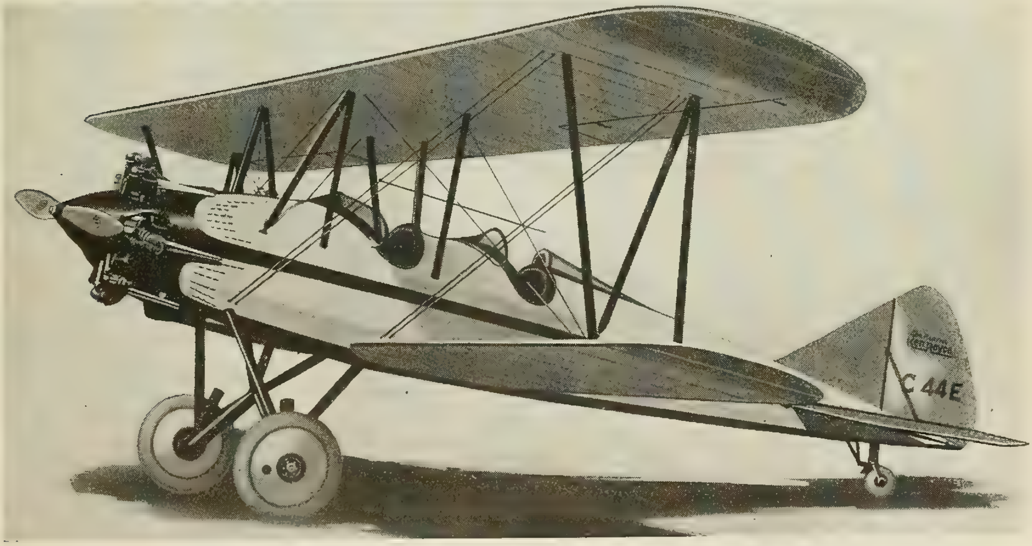
CRUISING SPEED (full load): 112 mi. per hr.

ABSOLUTE CEILING (full load): 24,000 ft.

RECORD: In over 100 local and national events it has completely outperformed in every point of comparison all biplanes of its class. It has won every speed contest entered against stock planes of its class, as well as planes carrying 55 more horsepower.

EQUIPMENT: Completely equipped, beautifully appointed, the KEN-ROYCE is not only the most graceful plane in performance, but also the most comfortable three-place biplane constructed and offered the public to purchase.

Approved
Type
Certificate
No. 232



Dealer and distributor organization under formulation. Territory open to those who make request for franchise. *WRITE* or *WIRE* for information.

REARWIN AIRPLANES, Inc.

FAIRFAX AIRPORT
KANSAS CITY :: KANSAS

Here's a fast-cutting combination

Strain a Starrett Hacksaw Blade No. 252 in a Starrett Frame and you have a combination that will see you through almost any cutting job that you run into around the hangar.

Starrett Hacksaw No. 252 has 24 teeth to the inch, the right pitch for fast cuts in tubing and sheet metal. With its flexible back, it will take all kinds of punishment on awkward jobs.

Ask your dealer for a supply of Starrett No. 252. Try one, in a Starrett Frame. See for yourself why you get more cuts and easier cuts.

The Starrett Catalog No. 24 AD shows the complete line of Starrett Hacksaws and over 2500 other Starrett Tools. Send for it.

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
ATHOL, MASS., U. S. A.

Starrett Hack Saw Frame No. 169

Starrett Hack Saw Frame No. 153

Use Starrett Hacksaws

3499

(*Continued from preceding page*)

and wait while he writes out a check. The first thing he will ask is how he is going to service the plane, who is going to fly it and where can it land. We must help him solve these problems if we hope to create a permanent and dependable market.

Before the war a condition similar to that now existing in the aeronautical industry obtained in the overseas markets for automotive products. The farsighted motor car manufacturers in this country realized that the foreign market had to be created and developed. Organizations were placed in the field to coöperate with municipal and civic bodies abroad in the development of good roads and the promotion of general interest in the automobile. Their motives were not selfish, but wise; for they knew that by careful and normal development a permanent and sizable market would result. They were willing to risk the first lean, unproductive years in the belief that the eventual results would justify their efforts.

To even a more marked degree must the same broad-minded policy be followed in developing a foreign market for our aeronautical products. We must be of assistance to the overseas consumer. If we expect him to purchase our products, we must make it easy for him to secure what he wants and not offer him a bewildering assortment of planes, parts and accessories each labeled by its manufacturer as the best made.

The large European producers of aeronautical products, long dependent on their foreign markets for their volume of business, realized in the early stages of the aviation industry the need for a whole-hearted program of coöperation in developing foreign trade. Some of the large airlines in Latin America are owned and operated by European interests. In a great many instances, these interests have subsidized operations in their colonies, taking an active interest in every phase of development. Artificial trade barriers have been erected to prevent the American manufacturer from reaching the foreign trade in aeronautical products as he has in other industries. Even though we may make better products more cheaply in this country, many foreign consumers find it easier to deal with the European manufacturer.

The big demand, the big development in the overseas markets, has hardly begun. The aggregate demand in any one territory today perhaps does not yet justify the concern's manufacturing a single product and establishing a complete sales organization to market it abroad. A truly logical method of acquiring export sales is a whole-hearted coöperation on the part of aeronautical concerns in this country wishing to build for the future in the belief that the eventual results will justify their present efforts.

BASIC FORMS FOR OPERATIONS

(*Continued from page 79*)

form is used for one day's flying only.

When the flight is completed for the day and this form made out as prescribed, we have: *Daily Aircraft Log* in original, *Pilot's Flight Report* in carbon, and an exact duplicate of *Daily Aircraft Log* and *Pilot's Report to Maintenance Department.* The form is turned in to the main operations office of the operating division. If the report is for an outbound flight, the report or form is sent to the operations office via a returning ship. These forms must be turned in intact for proper and expedient distribution.

When the form arrives at the operation office, it is

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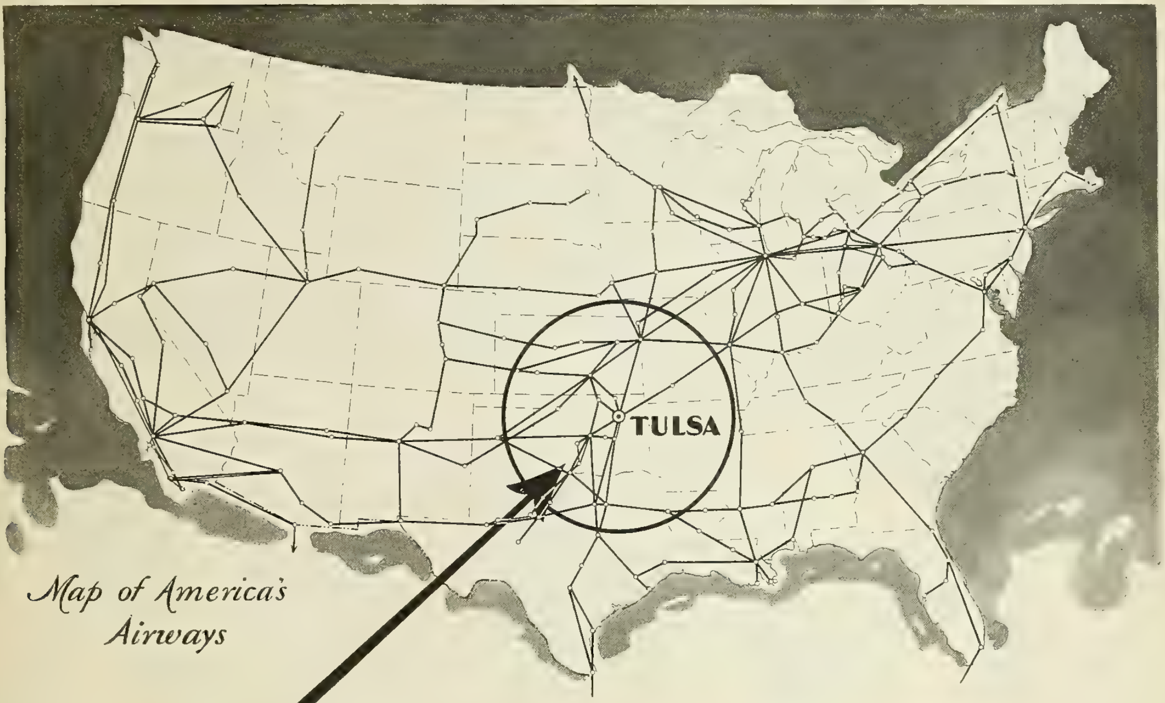

Map of America's Airways

The World's Most Receptive Airplane Market

SELLING is the greatest problem that confronts the airplane manufacturer. His other problems—such as housing, materials, labor, transportation—are tangible. His requirements can be purchased at market price. SALES, on the other hand, are intangible. He may spend unstintedly for salesmen and advertising yet fail to secure satisfactory sales volume

It follows that the airplane manufacturer should make MARKET his first consideration, in selecting a factory site.

Tulsa and her immediate territory represent the world's most receptive airplane market for these reasons:

1. This territory contains approximately 25% of the world's petroleum production industry, and this industry is the largest single user of aircraft.

2 Tulsa lies accurately at the crossroads of East-West and North-South air travel on the North American continent. Tulsa's municipal airport is today the busiest single airport in the country from the standpoint of arrivals and departures of fare-paying air passengers

3. Tulsa is the wealthiest city per capita in the world, and Oklahoma is one of the wealthiest states per capita in the Union. Here is found the combination of wealth, distances and all-year flying climate which is bound to result in maximum use of aircraft by all classes.

4. Tulsa is nationally central, thus within one day's flying time of any part of the United States, Southern Canada and Northern Mexico.

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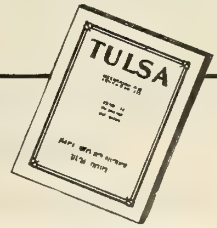

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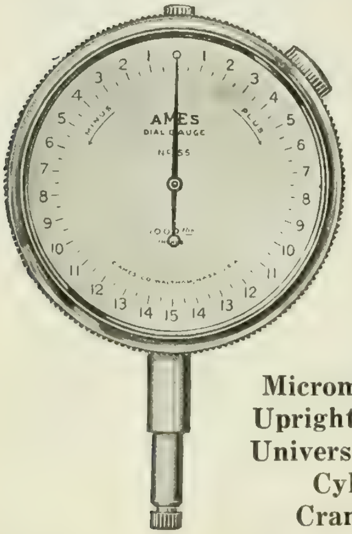

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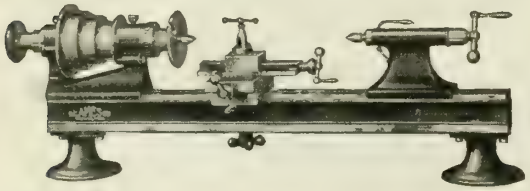

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902 Stephenson Bldg., Detroit

(*Continued from preceding page*)

separated at perforations and the *Pilot's Flight Report* is sent to the general accounting offices; the *Pilot's Report to Maintenance Department,* to the maintenance department; and the *Daily Aircraft Log* is retained in the operations office. By this method, each department or office receives the accurate information required in the shortest possible time after the flight is completed. Because the *Pilot's Flight Report* is the pay sheet, the pilot is careful to see that the report is correct in every detail and that it is delivered to the proper authorities. The accounting offices receive information for pay, aircraft and engine time, for depreciation, statistical information on type work, division or corporation, and miles flown. If any irregularities occur with reference to the flight, they are noted under "Remarks." The maintenance department receives information concerning performance of the airplane and engine immediately upon receipt of the form. The *Pilot's Report to Maintenance Department* is kept in the maintenance department where spark plug and oil logs can be accurately maintained. If the oil consumption increases abnormally on any engine, this can be detected from the oil consumption recorded on this report. The *Inspection* for the flight is on the reverse side of this report and facilitates a check-up on the inspector in the event of an irregularity.

The *Daily Aircraft Log* is retained in the operations office to be checked and to have the totals worked up. From this the engine log is accurately posted. The reverse side of this report is filled in at the operations office when work has been done on airplanes. In that office, these *Daily Aircraft Logs* are usually kept, according to the ship and nature of the service, in an open file for one month, after which they are transferred to the proper binder.

By using this basic form the various offices are supplied expediently with the information required, the pilot's "bookkeeping" is reduced, and the possibility of error in transcribing eliminated.

Aircraft Engine Log

The *Aircraft Engine Log* is of the same dimensions as one section of Operations Form 1-A and is likewise punched for insertion in the binder. This form is on a white stock of good grade, and entries are made in ink. (See figure 3.)

This form was devised to carry all the information with reference to the engine while in our service as far as operations are concerned, as well as to meet the requirements of the law and to furnish the purchaser, if any, valuable information.

Each form was designed to handle one month's flying, and twelve are required for one engine for one year. Quarterly engine time is, therefore, quickly obtained for reports. The work of keeping the *Aircraft Engine Log* is simplified to a posting operation of time from the *Daily Aircraft Log.* The use of an hours-and-minutes adding machine reduces the work materially, and increases the accuracy obtained. Work on the engine and parts installed is noted on the reverse side, completing engine log information.

When an engine is transferred from one branch or base to another, the *Aircraft Engine Log* accompanies the engine, whether the latter be in an airplane or in a shipping box. Engine logs are placed in the same binder with the *Daily Aircraft Logs* when the engine is shipped and being transferred or sold. Because the *Aircraft Engine Log* forms are white and the *Daily Aircraft Logs* are a yellowish-buff, no confusion is experienced.

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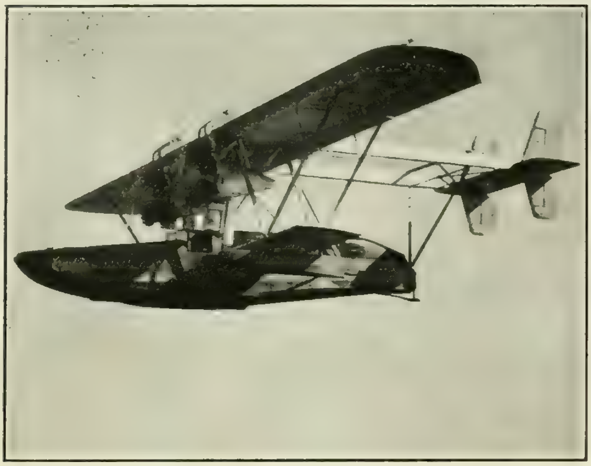

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WORCESTER, MASS.

INSPECTION OF AIRCRAFT METALS

(*Continued from page 75*)

a quantity of pure or alloyed metal for experimental purposes. This is done after the metal has been dumped out of the ingot molds. It is not released for shipment, however, until the smelter provides the inspector with affidavits testifying to the exactness of the composition of the metal. The inspector also obtains several samples which he has analyzed to check up the producers' analyses.

Since the mechanical properties of any alloyed metal are very much dependent upon the chemical content, jobbers are careful to see that the ingot shipments which they receive for use in foundry or forge shop meet specifications. Otherwise, they alone would be responsible for any defective materials.

In most instances, Government inspection begins in the plant of a jobbing foundry or forge shop. There the castings are poured and the forgings stamped out. Inspectors in the employ of the manufacturer carefully examine all castings for such defects as cracks, misplaced cores, pinholes, etc., which would permit the seepage of oil, gasoline or water. Small cracks may be welded satisfactorily, and small pinholes stopped up by the use of the ball-peen hammer. Where the pinholes or cracks are numerous, however, the casting is scrapped.

If the casting is to be heat treated, it is not turned over to the inspector until it receives the specified heat treatment, and in the case of most aluminum alloys, aging.

Following heat treatment, or if the casting is to be shipped to the contractor in the "as cast" condition following sand blasting, physical tests are taken on test bars which are cast from the same "heat" of metal as were the castings. As soon as shaken from the mold, the test bars, the physical properties of which are supposed to be representative of those residing in the casting, are stamped with the same number as the casting which they represent. On actual test it has been found that the physical properties (sometimes called the mechanical properties) in the individual test bar (of which four specimens are cast) are twenty-five per cent higher than the physical properties obtained in the casting.

A few manufacturers require that the jobbing foundries cast the test bars in the same mold with the casting. Although this, on the surface of things, seems to be the most desirable method, actually it is found that the physical properties obtained from such test bars are inconsistent with those obtained in the casting. No jobbing foundry, therefore, guarantees physical properties in castings on the basis of other than individually cast test bars.

Castings, as well as test bars, are tested for hardness. By the usual procedure, the Government inspector examines the castings for specification requirements, and then stamps them for shipment. The jobber then provides certificates or affidavits describing the castings by serial number, order number, pattern number; lists the physical properties obtained from the test bar of corresponding number and the chemical analysis of the "heat" of metal from which the castings were poured. These he mails to the contractor or assembly plant, which in turn gives them to the Government inspector stationed there.

In the case of forgings, test specimens are forged at the same time as the forging. When the forging is ready to be trimmed of "flash" (which simply means surplus material), the forged test bars are cut away, the one slab containing them being cut up into four or more pieces. The test bars then receive heat treatment and aging with forgings. Following this treatment, the hardness test (BHN: Brinell hardness number) is made by the use of a Riehle impres-

(*Continued on next page*)

TWO BIG AIR SHOWS IN FEBRUARY WILL START THE BALL ROLLING FOR 1930

International Aircraft Show

●

St. Louis 15-23

New York Aviation Show

●

New York 7-15

●

Two major aircraft shows promise to make February a banner month for the aviation industry. More than two weeks out of the four will be devoted to the most intensive sales efforts this business has ever witnessed. Advertising will make these efforts the more intensive by broadcasting sales messages all over the country before and during the shows and by following up valuable contacts even after the exposition doors have closed. AERO DIGEST will broadcast most of these messages, as it has always done in the past. And it will do more. Through its Pan-American editions printed in Spanish, AERO DIGEST will bring to the undeveloped markets of Central and South America, Mexico and Cuba this great panorama of American aviation. Future sales made in these countries will be influenced in no small measure by the sales messages contained in the Pan-American editions of "The Magazine of the Air." Please make your space reservations for the Show Issue early. First forms close on the 15th; final forms on the 20th.

AERO DIGEST
220 West 42nd Street, New York City

●

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He gets the big jobs because he understands them.

Marshall Flying School training is more than mere flight instruction. It fits Marshall-trained men for big, executive jobs . . . and Aviation, rapidly progressing, is seeking such men. Every day new openings are being created by the swift expansion of this great industry. Pilots, managers, technicians, and mechanics as well as executives are in constant demand.

Marshall Flying Instruction is Complete.

The Marshall Flying School, this country's original "College of the Air," offers complete Aviation training in regular courses based on departmentalized University Methods.

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At the Marshall Flying School, in addition to flight instruction and technical ground school courses, you can learn airline operations, airport management, and supervision of field activities. The sale and distribution of airplanes and aircraft supplies is another important phase of executive training.

There is a rich future for trained executives who can fly and who know Aviation thoroughly—let Marshall train you for a big job.

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The best paying mechanical and engineering jobs are now offered in Aviation. Marshall offers instruction and ACTUAL EXPERIENCE, under factory conditions, in metal welding, (chrome, moly, dural, and all metals commonly used in airplane construction) fuselage construction, wing construction and rigging, wing covering, the principles of aircraft design, and the repair and correction of instruments.

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Special 10 hr. Flying Course....	$200
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(*Continued from preceding page*)

sion machine, hand or motor driven, employing a 10 mm. impression ball, with 500 or 1,000 k.g. load. Passing the hardness test, the test bars are machined to standard size and "pulled" on either an Amsler or Olsen tensile testing machine. A standard test bar is .505 inch in diameter with a gauge length of two inches for aluminum alloys. For steel, smaller diameters for test specimens are necessary. Test bars are most commonly "pulled" for tensile strength, yield point, and elongation data. By the use of a special set-up, the breaking point of a forging or casting itself can be determined. This is perhaps the most useful information that can be obtained about the behavior of any part.

In the case of the "pulling" of test bars representing forgings destined for Government inspection, the Government inspector witnesses the operation, checks the machine operator's calculations, and signs the test sheets. Affidavits are also made out to cover the forgings, and the Government inspector makes out his own report sheets covering the forgings, as he does in the case of castings, rolled tubes, and other such materials. A copy of such report is forwarded to the Government inspector stationed at the plant to which the material is to be shipped, and provides additional check against error.

The inspectors employed by the forge shop inspect the work carefully at each step. Cold shuts, cracks, laminations, dross, and foreign matter must be kept out of the forgings. After company inspectors are satisfied that a forging possesses no defects, it is turned over to the Government man for his examination. The forgings are then shipped to consuming manufacturers and assembly plants where the parts are given the necessary machining and fitting.

Company inspectors at assembly plants, propeller plants, engine factories and accessory shops, must inspect such materials as are received in unfinished shape from foundries, forge shops, wire works, etc. After the necessary machinings are made, the parts must again be given a thorough inspection, which is both micrometric and microscopic. Machining reveals many flaws which cannot otherwise be seen and is often made for no other reason. Following assembly of generators, starters, motors, fitting of tubes, and balancing of propellers, a thorough examination is again made by the company inspectors, and followed, if designated for Government purchase, by Government inspection and approval. On all work intended for the Army or Navy, each step is carefully supervised by the local inspector, who is sometimes assisted by additional inspectors who have specialized in the supervision of certain processes.

In the assembly of planes, all affidavits, reports, and other records are checked by the Government inspector before the assembly line starts moving. As with the individual parts, each operation is carefully checked, and any material which is suspected of defects is promptly held up until any and all doubts as to its airworthiness are carefully disposed of. When the plane is finally rolled off the floor, it is either taken down and crated or flown away.

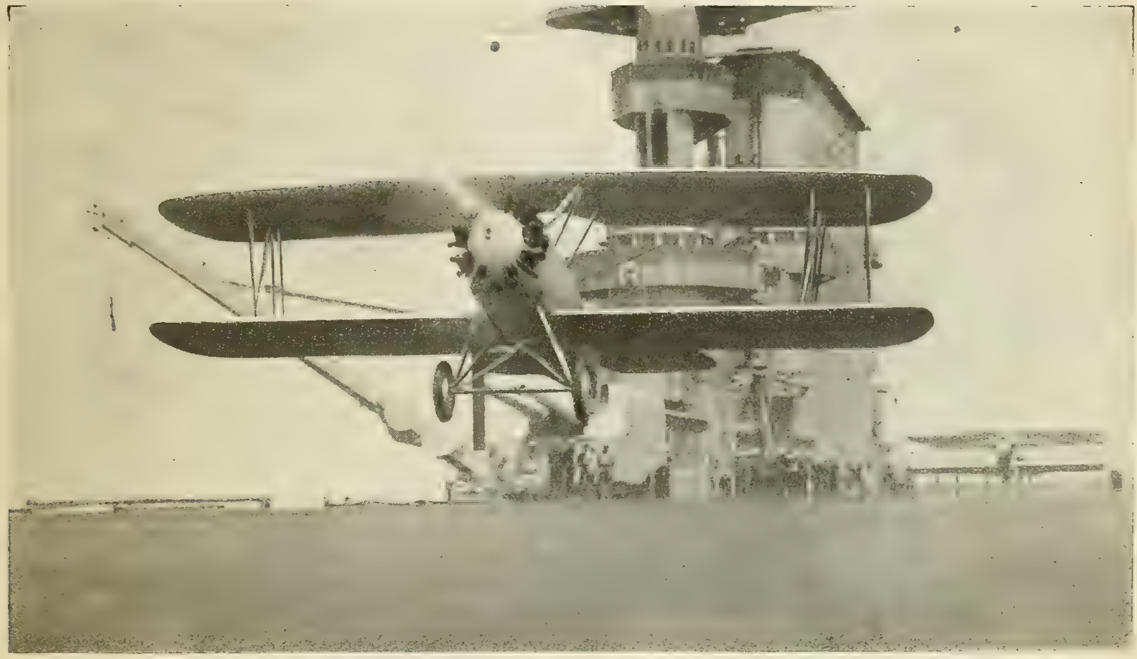
In commercial work the procedure along the assembly line is essentially the same, except that the supplementary supervision which the Government provides is absent.

The question may arise in one's mind as to the extent of the powers held by the Government inspector. The following is an occupational description approved for Wright Field by the Civil Service Commission: "Under direction, the Metal Parts Inspector inspects all raw and processed ferrous and non-ferrous materials purchased for or manufactured for and (or) by the Engineering Division, to de-

(*Continued on next page*)

"Corsairs"

on That Most Effective Arm of the Navy ... The Aircraft Carrier



THIS Corsair is taking off from the deck of the aircraft carrier Lexington. One of the Corsairs aboard this ship is the A-7543.

Corsair A-7543 knows many carrier decks. From the factory A-7543 went to the U. S. S. Saratoga at Newport. After several months it then went to the U.S.S. Langley. From the Langley it went to the Naval Air Station at San Diego, where it was assigned for duty with the VS-1B squadron. From San Diego it then went back to carrier service on the U. S. S. Lexington, where it still is.

Service on an aircraft carrier is exacting. Take-offs must be short—and rapid. Landing must be made into arresting gear on the carrier's deck. To stand the gaff a ship of speed, power, maneuverability, and ruggedness is required.

Corsairs—the A-7543 and its sister ships—are performing this duty day in and day out with our Navy on board its aircraft carriers.

CHANCE VOUGHT CORPORATION

DIVISION OF UNITED AIRCRAFT & TRANSPORT CORPORATION
LONG ISLAND CITY, NEW YORK

AVIATION NEEDS TRAINED MEN

Colonel Lindbergh says:

"There are many phases of aviation in addition to actual flying" . . . "Flying proper will be but a secondary consideration in a comparatively short time." . . . "Planes built along the lines of those being tested in the Daniel Guggenheim Contest soon will be as easy to fly as a motorboat is to run."

—N. Y. Herald Tribune, November 27th.

Colonel Lindbergh is right! There are about seventy jobs on the ground for every one in the air, but every one of these jobs is open only to a trained man. Drafting, Designing, Engineering, Engine and Airplane Mechanics, Wood or Steel Working, Painting, Maintenance, Radio, Welding, Executive and Office Work—these are some of the many positions that are open in Aviation.

A short course at the Institution of Aeronautics, Inc., and an enthusiasm for this industry will start you on your way to independence.

Our Employment Service has placed over 250 men in the last 120 days who are earning part of their expenses while learning. What we have done for others we certainly can do for you.

Invest in yourself to the extent of financing your course and we will find you a position in New York that will defray your living expenses. This is a real opportunity for a limited number. Successful completion of our course will prepare you for an enviable position which others less ambitious can only wish for.

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Please send me details of your courses as soon as possible.
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(*Continued from preceding page*)

termine whether or not they comply with specifications and drawings. He makes up inspection reports for the Chief Inspector."

The requirements are as follows:

"The Metal Parts Inspector must have two years of high school education. He must have completed his apprenticeship and have had at least two years' experience as journeyman machinist or tool maker, one year of which has been spent in the actual fabrication or inspection of automobile or airplane metal parts. He must be able to read blue prints easily and accurately. He must have a thorough knowledge of all precision tools used in such inspection.

"In lieu of two years' high school education, there may be substituted two years of progressive experience as machinist, to which must be added the journeyman or inspection experience mentioned above.

"While two years of high school education and three years experience as journeyman machinist or tool maker is required, a graduate of a manual training high school with machine shop training and with three years' experience in a machine shop manufacturing aircraft parts is desired."

A little reflection will show why several years of experience as a Government materials inspector should qualify a man for work with almost any airplane manufacturer, not as a mere laborer, but as a valuable executive.

SELLING AIRPLANES TO BUSINESS HOUSES

(*Continued from page* 82)

portation has been mastered as far as locomotion is concerned. The main problem for an executive to consider is the degree of safety for which it can be used. Our company now has eight plants in six different cities in three states. Some of our most important men are constantly having to travel around this circle; undoubtedly much time and effort could be saved by air transportation; the whole problem is, can we as yet afford to risk the lives of men that cannot be replaced, just to make a time saving?"

Another letter from a district sales manager in the Southwest says:

"It is our understanding that you are flying an airplane with the idea of making some analysis of this method of transportation. If you have any information that you could conveniently give us regarding the desirability of such a conveyance for sales work over a large territory in the Southwest, I would very much appreciate receiving it."

Still another letter from a large eastern manufacturer:

"Our men make something like one thousand round trips a year (from eastern to midwestern cities), and we should like to secure data showing what equipment would be necessary to purchase in the way of a plane, probable cost of a plane, cost of pilot to operate it, and all other maintenance charges to go with such service on two, four and six-passenger planes. We should like some figures comparing the probable cost of such a privately owned and operated service with any commercial service available or likely to be in the future."

Thus we get something of the picture of the average business man's thinking regarding the airplane, his interest in it and the resistances that have kept most of them from purchasing. The business man who has bought was forced to overcome these resistances through his own initiative in obtaining information which would show him the soundness of such investment.

(*Continued on next page*)

Your Place is HERE!

Major Rockwell ... invites You to Join Him in AVIATION ... ...

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Just devote about an hour a day to my home study course and in 12 weeks you can be mastering all the principles of Ground Training, which are necessary before you take your place in any branch of Aviation. In a few short months I will give you practical aviation training and prepare you for one of the many fascinating ground jobs, or the thrilling work of a skilled flyer with earnings from $50 to $150 per week. I help you find your place in aviation and I'll train you to succeed quickly.

No Advance Education or Experience Necessary

You don't need to have any special education or experience to master my course. Everything is so clearly explained with text and pictures that you will be able to grasp every fundamental principle of aviation ground work and be able to qualify for any important aviation job at big pay. My Home Study Course will give you all the knowledge necessary to pass the government's written examinations for a Mechanic's, or Pilot's license.

Learn All the Principles at Home Then if you Want to Fly—

When you have completed my ground course I will arrange for you to take flying instructions at an airport near your home at reduced rates, or you can come to Dayton and get training at one of the finest airports in America. Either way you can qualify for a pilot's license, and a high pay job. Aviation, the world's biggest industry, is calling you. Take the first step now by mailing coupon for Free Book and details.

Major R. L. Rockwell,
THE DAYTON SCHOOL OF AVIATION
Desk A-43, Dayton, Ohio

Satisfaction or Money Back

If you are not entirely satisfied when you have finished my course and are not qualified for big aviation job, I agree to return every penny of your tuition.

Get My No-Risk Plan My Big Book Explains ALL I'll send it FREE

How Take Your Place in AVIATION
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BYRD CROSSES SOUTH POLE

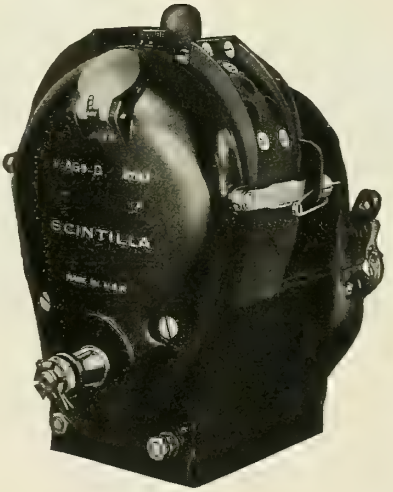
With

SCINTILLA

AIRCRAFT MAGNETOS

in the

Ford Tri-Motored Plane "Floyd Bennett" powered with Wright Engines—"Cyclone" and "Whirlwind-Nine."



Scintilla Aircraft Magnetos served Commander Byrd on his North Pole Flight, May 9, 1926, and the Trans-Atlantic Flight, June 29, 1927.

The majority of modern American Aeronautical Engines are equipped with Scintilla Aircraft Magnetos.

THEY ARE SELECTED BECAUSE OF THEIR

Dependability
Simplicity
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[TERMS]

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(*Continued from preceding page*)

Obviously, if we as airplane manufacturers are to develop sales in any great quantity, we must meet these obstacles in the minds of business and overcome them. But how?

There is, of course, the great task of overcoming the fear of the entire public, of wives and non-business people, as well as business executives. Primarily this fear is based on a lack of understanding. The early daredevil exhibitions and fatalities of fliers, the thrilling stories of aerial combats and deaths of war-time fliers and the more recent tragedies of transoceanic fliers have constantly kept danger in the forefront. The story of a non-hazardous flight has scarcely been news. There is a big job, then, for the entire aviation industry in getting across to the public the safety and sanity of ordinary flying. It should be told in everyday, understandable language, in terms of getting from this place to that with comfort and dispatch. Its usefulness should be pointed out. The people must learn to feel that they can climb into their own ship or into a transport liner with the same assurance of safe arrival at destination as in the case of train, steamboat or automobile. A tremendous task, this, and one which has not yet been adequately attempted. Perhaps the only answer to this is the banding together of all aviation manufacturers to carry on such an educational campaign.

Conquering the fear of the business executive is part and parcel of this greater job. Specific facts and information can be got across to him. And aviation manufacturers must appreciate that they cannot rely upon free publicity in newspapers and magazines to do this job. We must remember that human psychology is such that news, as our editors ordinarily interpret it, deals with the unusual, the hazardous and spectacular. It will take carefully prepared fact-stories of the everyday usefulness of the airplane to be convincing, and these must of necessity be carried to prospective customers in paid space. Otherwise, our task will fail of accomplishment or it will require many slow and painful years.

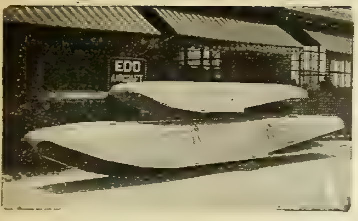
Next, the fact of high cost must be encountered. We may hope in the years ahead to reduce costs to a basis that is comparable with other forms of travel. Today that is hardly feasible. But, after all, it is accomplishment through a more effective use of time that is the real index of the airplane's value rather than cost of a specific performance in contrast with other less effective methods. We must show the business man what the airplane will accomplish, and that in this accomplishment lie profits, though initial and operating costs may increase.

For example, a San Francisco representative of an Ohio tire manufacturer, in competing for a 10,000-tire order, found it necessary to have a sample from the Ohio factory within 24 hours' time. The tire was shipped by air express at a cost of $41.50 and arrived in time to enable him to meet competition and secure this order, to be followed with annual purchases of over $50,000. The tire could have been shipped to San Francisco by train at a cost of $3.02 in approximately five days, a saving of $37.48; but it would have meant a loss of over $50,000 in annual business.

In the same way, in personal travel as in shipping goods, the fact of accomplishment can be shown to be profitable in a multitude of cases.

Lastly, it becomes necessary to help the business man to discover the uses to which he can put the airplane in his business. Most airplanes bought by business houses in

(*Continued on next page*)



Largest and Smallest Edo Floats

(List revised to December 15th, 1929)

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Transport companies, schools and private flyers today fully recognize the advantages of over-water flying. Continuous airdromes, closer contact with centres of population, freedom from dependence on flying fields, are considerations that have resulted in the rapidly increasing use of seaplanes.

In the choice of gear, leading manufacturers invariably select EDO all-metal float installations for their greater efficiency and economy. Eleven standardized models are now being produced suitable for all weights of land planes up to 8,250 lbs. gross load. They have been installed on 40 types of commercial planes, including a majority of the leading makes.

EDO makes nothing but floats and EDO Floats are the finest that engineering skill and specialized production can evolve. They have been developed and perfected in close collaboration with the engineering staffs of the foremost airplane makers.

Pilots and owners will be gladly furnished with full particulars of EDO Float Installations on request. Manufacturers and dealers are invited to write for the EDO Plan. Address Edo Aircraft Corporation, 610 Second Street, College Point, L. I.

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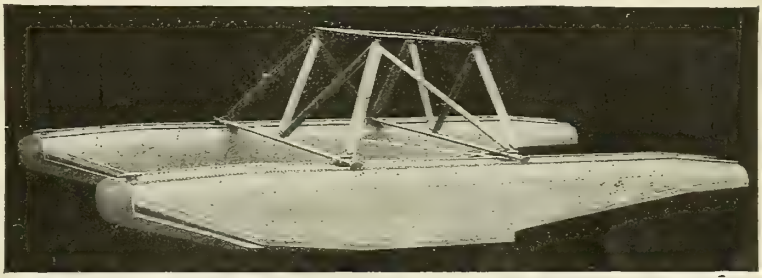
THE FLOAT MAKERS

Edo Standardized All-Metal Float Installation



.....if you like fine tools you'll want these pliers

DO you like to work with fine tools? Have you an ambition to own them? Do you know the "feel" of quality tools in your hand?

If you can answer these three questions with a "yes" you will want to own the "Aviator" as a permanent adjunct to your personal tool kit.

The difference in price between the "Aviator" and ordinary pliers is trifling, but the difference in quality is immeasurable.

Quality in the "Aviator," starts with the steel they are made of—electric furnace high carbon molybdenum alloy tool steel, hardened and tempered to the core. Hard—tough—***strong thru and thru!***

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Designed just for airplane work—light in weight, yet powerful. A little giant for strength. Useful in a hundred ways around a plane for gripping, twisting, pulling and cutting.

Thousands of airplane mechanics are the proud owners of an "Aviator." Order a pair today and you'll understand why. If your jobber can't supply you, send to us direct. We pay parcel post.

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The "Aviator"
No. 67—7 in. $2.00

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Your Name Etched FREE on Handle.

Vacuum Grip Pliers
REG. U.S. PAT. OFF.
Over 600,000 in Use

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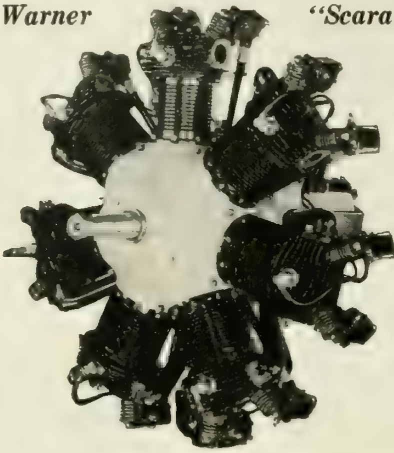
The Warner *"Scarab"*



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JAEGER WATCH COMPANY INC
E. L. VAIL, VICE-PRES
304 East 45th St., New York, N. Y.
London Geneva Paris

AERONAUTICAL TIMEPIECES

(Continued from preceding page)

the past have been bought with the main thought of their publicity value. Undoubtedly this has been of real importance, but there are many other uses which have not been realized and capitalized.

A banker in Arkansas uses his airplane to cover the many neighboring cities in locating sites for chain stores which he finances. The present Governor of Wisconsin "stumped" the state by plane. Sales managers in many parts of the country cover thousands of miles making contact with dealers and prospects. In short, there are a multitude of uses for the airplane which even the airplane manufacturer has not yet discovered, and the prospective purchaser is still more ignorant of its possibilities. We can list some of these uses under the following heads:

(1) Publicity of Advertising
(2) Customer and Prospect Cultivation (or Entertainment)
(3) Building Employee and Dealer Enthusiasm, Loyalty and Morale
(4) Transportation of (a) executives (b) salesmen
(5) Transportation of Products or Mail
(6) Protection of Lowered Inventories.

The list is incomplete but shows how a careful analysis of the prospect's business and his needs will develop new uses and new applications which have hitherto been unsuspected.

Manufacturers of airplanes, then, can study the uses to which present airplane owners are putting their ships and carry the story of these uses to other business houses. But perhaps still more effective would be the selection of concerns that seem to be the best prospects and the studying of their situation and their business operations to determine where the airplane can fit in as a practical and profitable tool. This will require a knowledge of both aviation and business; it will take time and money but its profit to the aggressive manufacturer can hardly be denied.

The task as outlined is no easy one. Its accomplishment presupposes a strong selling organization. Nor will our work be successful except as we build our organization and our activities to overcome the peculiarities of resistance in this field.

All businesses, of course, are basically alike, yet all are different. We can hardly hope to sell airplanes by carrying over the same practices that have proved successful in other enterprises. There is a challenge to the manufacturer who wrote me, "We are employing the natural fundamentals of selling as applied to any other commodity." Insofar as this includes natural selling principles, he is undoubtedly right; but, unless the peculiar resistances of airplane selling are taken into account and the sales activities molded accordingly, there can be little hope of high effectiveness.

From a selling standpoint, the industry has had an unfortunate history. In recent years there has been no need of selling. The principal activities of the business have been those of making airplanes and of financing. And much money has been made.

But the day of easy business is well-nigh over. New manufacturers spring up overnight. All existing manufacturers increase their production capacity many fold. Yet little has been done to develop a market that will absorb the ever-increasing number of aircraft.

Naturally, it is difficult for the airplane manufacturer to realize that now he must begin to spend money for sales. And he hates to take the lesson that every other industry has learned—that just as real money must be put

(Continued on next page)

All Good Engines Are RELIANCE Tested

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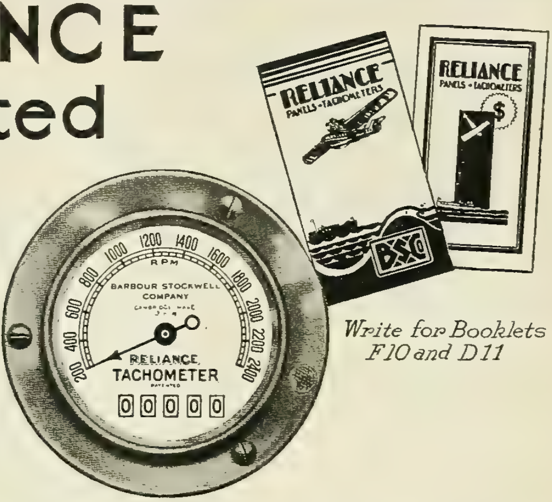
and many others



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BARBOUR STOCKWELL CO.
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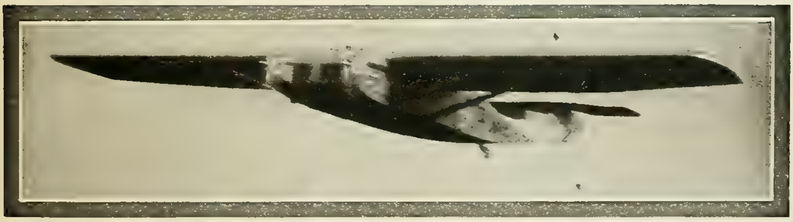

The Chapman Air-liner with landing gear retracted, in flight. Designed and built by V. J. Burnelli.

Some of the Outstanding Advantages of the Burnelli Type Are:

Power Plant Accessible While In Flight, Reduction of Head Resistance, Fuselage Lift, Decreasing Landing Speed, Increased Cabin Space, Reduced Turning Moment On One Engine, Practical Landing Gear Retraction, Structural Simplicity, Efficiency, and Rigidity.

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BURNELLI TYPE AIRCRAFT

V. J. BURNELLI

Factory: Keyport, New Jersey
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Large airplanes constructed under proprietary and patented design features of the Burnelli Type

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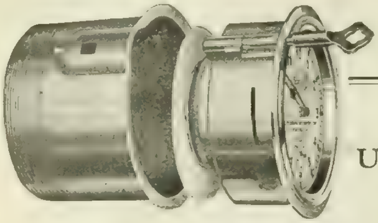

THE
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$28.00

Keep an Accurate Record of Engine and Flying Time

Ust-Clock reduces the expenses of operating your planes by giving you a 24-hour vibrator written record of their movements.

By knowing the efficiency of your planes—by eliminating guess work—unnecessary overhead can be quickly and easily reduced. You owe it to your pilots and you owe it to yourself to have complete records of idling time, take off, flight, landing, hangar-time, etc. Ust-Clock gives you this information accurately and completely.

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No drive is necessary. Easily installed

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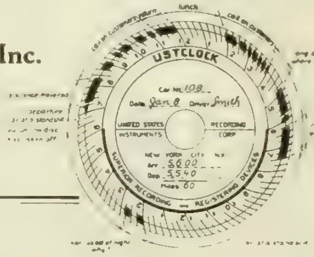

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DISTINCTIVENESS
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These qualities, which have made Rainbow Neon tubes the standard for commercial signs, now serve Aviation—

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AERONAUTIC DIVISION
RAINBOW LIGHT, Inc.

(Continued from preceding page)

back of production and operation, so must real money be invested to meet the heavy competitive selling that is upon us.

In preparing this material I attempted to get data which might show the amounts of money spent to obtain sales in other lines of business as compared with the aviation industry.

Evidently, I was too ambitious, for I found it almost impossible to get complete figures for either non-aviation businesses or aviation companies. But what material is available points to the fact that, whereas similar but non-aviation businesses have found it necessary to spend from 20 to 45 per cent of total sales on selling costs, most aviation concerns have been operating with a maximum of 10 to 20 per cent, and many manufacturers have invested practically nothing in selling. And this at the start of market developing, when exceptional effort is logically required.

In short, to meet competitive conditions and to develop our market, we must learn that money invested in selling is not only a prime essential but is one of the most profitable policies that can be followed.

Sales activities will logically follow the outline given in overcoming the peculiar resistances found. Sales managers, salesmen and dealers must be educated to the uses of aircraft; they must be educated in analyzing the needs of the prospect, that they may show him a practical application for his business.

The sales organization is confronted at the outset with the difficulty of locating worth-while prospects. Whereas in selling automobiles we may assume that any individual with a certain financial rating is a worth-while prospect, in airplane selling not only price but the fear element and the lack of appreciation of the airplane's use must be met.

The proper selection of prospects for intensive cultivation and immediate sales is obviously complicated and difficult. It suggests that we must find a method of locating such prospects through the establishment of or close association with flying schools, air taxi services and airlines to determine who among our prospects have developed beyond the fear hazard. Other checks, such as type of business, will indicate where usefulness of the airplane can most probably be found. A close analysis and study of these businesses to demonstrate the airplane's application will be necessary to educate them to its practicability.

Is this business market worth such expensive cultivation? What are its possibilities for sales? Obviously, it is impossible to estimate this with any great degree of accuracy. We know that today hundreds of concerns are using airplanes. Also we know that there are 85,766 businesses in the United States rated at $75,000 and up, and there are 197,963, top executives in these organizations. Undoubtedly many of these businesses can make profitable use of the airplane for these executives and for their men.

Past and present experience has shown that business men can and will use the airplane as we educate them to its safety and usefulness. How far it will be developed is entirely up to the manufacturers of airplanes. The average manufacturer undoubtedly will feel that he cannot afford such a pretentious sales program, but with the heavy competition that faces us in the immediate future, can any manufacturer afford not to develop the strongest sales organization possible and intensively cultivate every market for sales?

The heavy financing of airplane manufacturers during recent years has eliminated the opportunity for shoestring operation. Too many manufacturers are going after the

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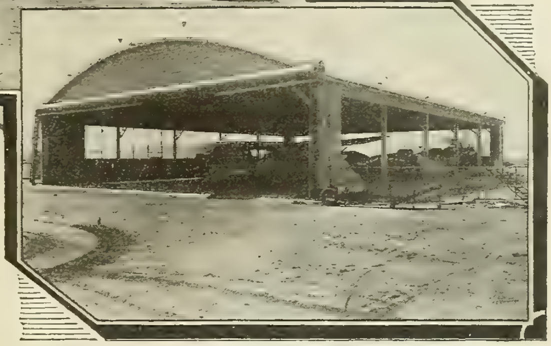
Wilson

A Gale Is Nothing to Wilson Rolling Steel Doors

Walls gave way but Wilson Doors held.



Hangar at Buffalo Airport after gale. Ease of operation of Wilson Doors not affected by terrific strain which demolished the walls.

At the Buffalo Airport recently, winds reaching hurricane velocity blew in the masonry and steel sash at the rear of one of the hangars (illustrated).

It then struck the Wilson Doors on the front and making no impression on them, veered off to the left and blew out the masonry wall and steel sash in the bays between steel columns.

Considering that as soon as the rear wall collapsed the hangar presented virtually a wind tunnel it can be appreciated how rigid the Wilson Doors were.

When considering doors for hangars specify Wilson for maximum protection, simplicity and ease of operation, and long years of service.

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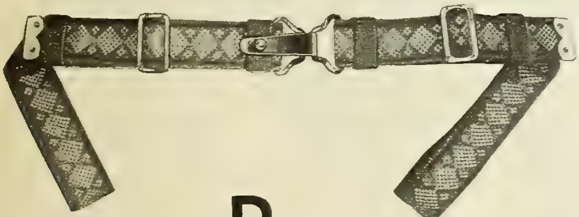
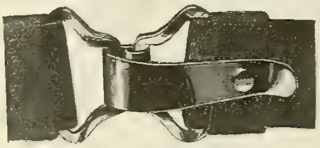
11 East 38th St. New York City
Offices in all Principal Cities

OVER FIFTY YEARS IN BUSINESS



THE NEW RUSCO Safety Belt

WITH THE SNAP-LOCK BUCKLE



▲▲▲ POSITIVE PROTECTION without adjustment has been achieved for the first time in the new, decorative, RUSCO Safety-Belt . . . the first belt designed for the true comfort of the passenger. It is the only belt which may be fitted loosely and comfortably around the passenger, allowing perfect freedom of movement. Its rayon appliqué design, available in many color combinations, makes it appear an attractive part of the upholstery. ▲▲ The SNAP-LOCK quick-release buckle, protected by patents pending, is easily snapped into place, ensures a positive protective lock at all times, and releases as quickly as any buckle. ▲▲ Other RUSCO belts are made to meet every requirement of pilot and passenger. All belts are available for immediate shipment. WRITE FOR AERO CATALOGUE.

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Leading aeroplane manufacturers use Fischer Tachometer Drives. Made of highest quality materials only —and strictly to government specifications.

For your convenience we maintain a full stock of all sizes of flexible shafts and will gladly quote prices on request.

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240 Kent Avenue, Brooklyn, N. Y.

WIRE SPRINGS METAL SPECIALTIES

Ready to Use
Needs only Heat

QUICK

Quick, simplified operation—no separate fluxes, acids or pastes. Quick savings in time and money on many phases of production and maintenance.

Our experimental and research department is maintained to study your individual soldering problem and adapt the complete Kester line to your needs. This consultation service imposes no obligations. Your request will bring an immediate and authoritative analysis.

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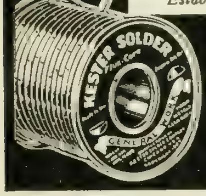
Established 1899—Formerly Chicago Solder Co.



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The National Aircraft Welding School,
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Please send me booklet and complete information describing Aircraft Welding and your School.
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(*Continued from preceding page*)

business. Those who will survive will be the ones who invest wisely in sales cultivation and in rapid development of sales rather than those who wait for a slow development, which will result in their being swamped by the heavy competition of more aggressive selling organizations.

Paper presented at the Aeronautic Meeting of the Society of Automotive Engineers, Cleveland, Ohio.

GUGGENHEIM FUND CONCLUDES

(*Continued from page 72*)

tics, opinions, government reports, and all manner of information. Continuing:

"Such considerations as the foregoing have convinced me that there is a function which can only be performed by private enterprise aside from the proper function of government. So much remains to be done before civil aviation can realize the possibilities before it, that everyone must recognize that there intervenes a period of necessary study and experimentation.

"In these circumstances I have decided to establish the Daniel Guggenheim Fund for the Promotion of Aeronautics and to place at its disposal the sum of $2,500,000. The Fund will be administered by a Board of Trustees composed of men of eminence and competence."

Mr. Hoover wrote a formally cordial letter thanking Mr. Guggenheim in sonorous terms, but, as later events showed, he was secretly quite interested. This action in some respects paved the way for the subsequent establishment of the Aeronautics Branch, Department of Commerce.

The Fund came into being in January, 1926, with four objects to attain:

To promote aeronautical education both in institutions of learning and among the general public.

To assist in the extension of fundamental aeronautical science.

To assist in the development of commercial aircraft and aircraft equipment.

To further the application of aircraft to business, industry and other economic and social activities of the nation.

The first meeting of the trustees determined that the Fund should be guided by five general principles; to wit: Restrict the work to civil aeronautics; avoid duplication of effort with other aeronautical organizations; avoid work which is properly a government function; plan work carefully, to concentrate effort and to carry any investigation or project through to a definite conclusion; and maintain a simple, inexpensive directing organization, depending on outside established agencies, whenever possible, to carry out the aims of the Fund.

Daniel Guggenheim made out a deed of gift for $500,000 as a preliminary working capital, and the Fund forthwith commenced operations. It was organized as a corporation, rented offices, engaged personnel. Until the first annual meeting, Mr. Guggenheim appointed certain men of prominence as directors, among them being H. I. Cone, F. Trubee Davison, Harry F. Guggenheim, Dwight W. Morrow, Elihu Root, Jr., and John D. Ryan. After the first meeting, four additional members were added: William F. Durand, George W. Goethals, A. A. Michaelson and Orville Wright. H. I. Cone, a retired rear-admiral of the Navy, was appointed vice-president.

Among the first activities of the newly-established Fund was the publication of a pamphlet which was distributed to a wide mailing list, setting forth the aims of the Fund, identifying its principles and asking for suggestions and

(*Continued on next page*)

Still Preferred by THOSE WHO FLY—

This—together with the fact that

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are installed at

Practically every Major Airdrome in the world—
Nearly all of the most important Air Terminals—
Airports at the Main Cross-Roads of Air Travel—
AND WHERE
Maximum Safety is the deciding factor—
SHOULD BE OF PARTICULAR SIGNIFICANCE TO
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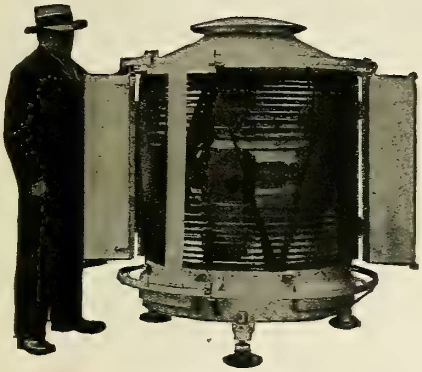
Aviation's Bad Weather Floodlights

We urge you investigate their superior illumination qualities—true 180° beamspread—greater area coverage—even distribution (no high or low spots)—maximum intensity with minimum glare. It is the combination of all these features found only in B.B.T. Floodlights, which have made them the industry's Standard of Comparison.



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Your Airport deserves the Best.

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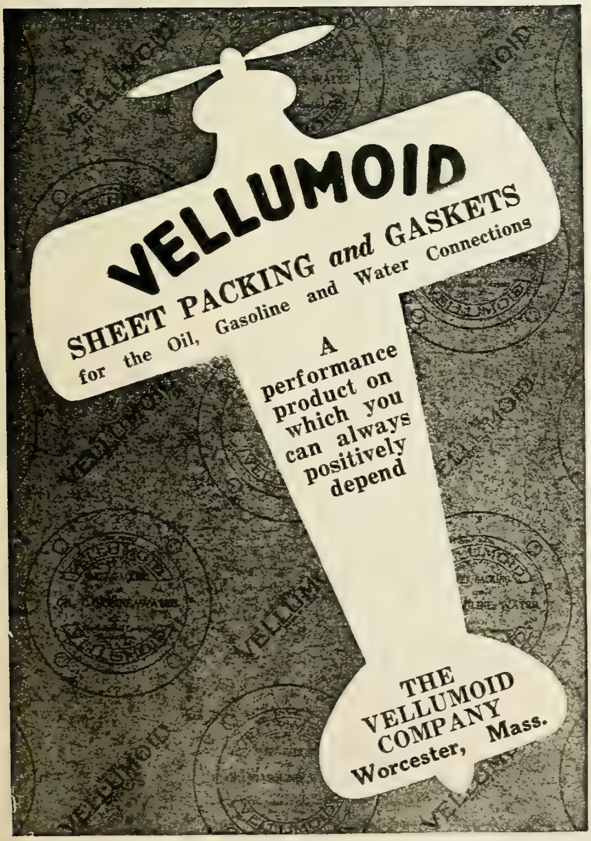
A copy of our Latest Catalog "SAFE AIRPORT LIGHTING" *should be in your hands. Shall we send it?*



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for the Oil, Gasoline and Water Connections

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THE VELLUMOID COMPANY
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—for speed, power, accuracy and time economy in

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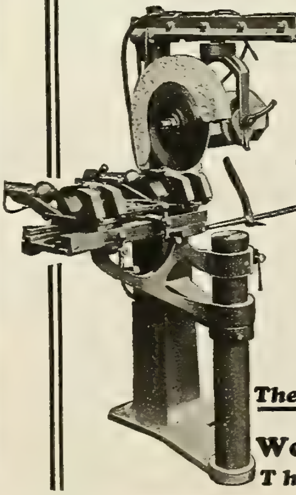
Speeding up production, maintaining accuracy and cutting down costs are DeWalt's contribution to the airplane industry. For the DeWalt Wonder Worker is now used by 80% of the industry for cutting Chrome Molybdenum steel tubing, flat stock and other metals.

Send in the coupon for full information about DeWalt performance in the manufacturing of airplanes.

The DeWalt may also be quickly adapted for various kinds of woodworking.



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Tell me how the DeWalt cuts costs.

Your Name ____________________
Firm Name ____________________
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The DEWALT
Wonder Metal Worker
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Manufactured by Wittkowsky at Berlin

Aviation Engineers familiar with European production will recognize

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The World's Supreme

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unmatched in the precision of its manufacture . . . . its water resistance . . . . its uniformity and its ability to remain flat.

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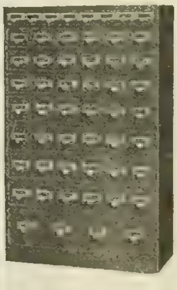
Angle Steel Stool Co., Plainwell, Mich.

Agents and Dealers in All Principal Cities

No. 36-24 Cabinet (Right) Top serves as work table. Size: 36" high, 24" wide, 16" deep. Two loose and adjustable shelves. Key-locked door. Olive green lacquer finish.

No. 36-24 Tool Cabinet



No. 3875 Sundry Cabinet. Has 54 drawers of varying sizes. Size 25½" wide x 11¼" deep x 43½" high. Just the thing for small parts

(*Continued from preceding page*)

aid from everyone concerned. It stated that after a preliminary study of possible activities, the Fund had subdivided itself into four groups: Education, Scientific Research, Commercial Development and Educational Information. These four groups continued intact for the duration of the Fund's life, and everything accomplished by it falls under one of these heads.

During 1926, the Fund was laying the foundation for the smooth operation of each of these subordinate groups. Representatives were appointed in England, France, Holland, Italy and Germany. The Educational Information group proceeded to study and report on certain forms of aviation activity and published small booklets on these activities, sent to newspapers, public officials, aeronautical magazines and a representative list of aviation personages. The Commercial Development group became interested in the problem of helping airlines to get money to purchase much-needed equipment. One of its most important actions was to form an Aircraft Equipment Trust similar to those in railroad practice, and it loaned money to new air transportation companies to buy new and up-to-date equipment, develop airport facilities and ground services. It undertook a study of the financial problems of airlines and rendered an exhaustive report on the subject. It undertook to replace the aloof banks as a means of financing worthwhile companies. Many of the strongest companies now in existence were kept in operation through the year and through 1927 by this means.

In 1927 occurred a metamorphosis in the world of aviation, and the Fund had to re-adjust itself accordingly. The flights of Lindbergh, Maitland and Hegenberger, Byrd and Goebel stimulated public enthusiasm to the fever point. The reaction was sudden and dramatic. Money began to be available for aeronautical industries. Banks swung from disapproving scorn to enthusiastic coöperation. Aeronautical stocks began to be an investment. Even the Seaboard Air Line Railroad, a quiet and unobtrusive east-coast railway, found all its outstanding stock eagerly snatched up by frantic investors who thought it had something to do with aviation.

This activity changed the position of the Commercial Development group from that of a financial aid to that of a firm restraining influence. It found that aviation companies could get money almost anywhere, and often got entirely too much for their own future welfare. Accordingly, Harry Guggenheim stated in a bulletin that henceforth no more money would be loaned to operating companies, that the Aircraft Equipment Trust was henceforth out of business, and that the Fund would confine its activities entirely to research.

During the latter part of 1927 and the first of 1928, the Commercial Development group changed its policy to correspond with the announcement and attempted to introduce the subject of air travel to the nation. The group had sent Floyd Bennett around the country in 1926 with Commander Byrd's North Pole Fokker in order to give the populace a chance to see what a trimotor airplane looked like. Very few persons had seen one up to that time, and the Fund believed that by introducing a famous ship to the country as a whole, many persons would be receptive to the idea of air travel. The success of this mission led the Fund to sponsor Lindbergh's tour in 1927, which he made after he had returned as a hero from his trans-Atlantic flight and European trip. The Lindbergh tour was one of the most successful projects ever undertaken by the Fund, and the history-making venture marked the beginning of

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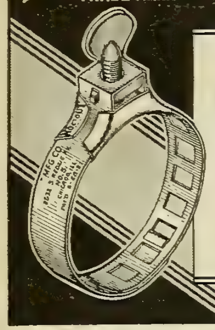
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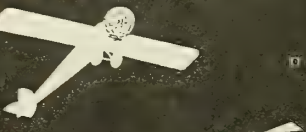

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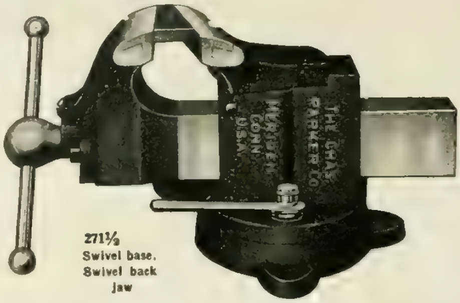

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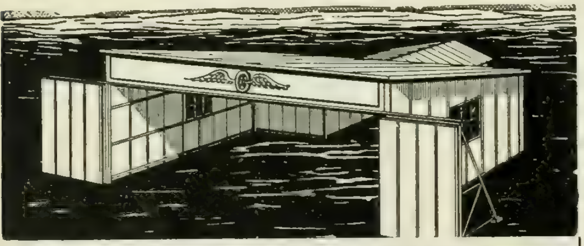

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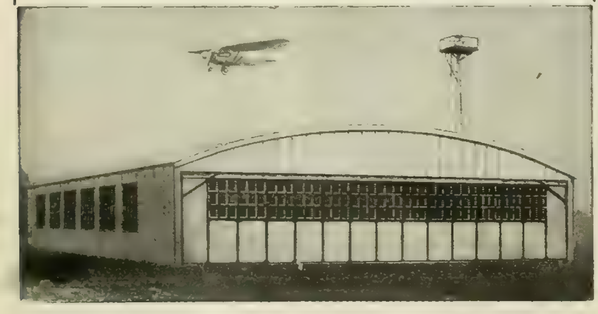

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public interest in travel by airplane. The effects of his trip are discernible even today, and thousands of people all over the United States still believe the *Spirit of St. Louis* is the last word in airplane design.

In June, 1928, Rear Admiral Cone resigned as vice president of the Fund in order to accept appointment to the Shipping Board. In his place, the Navy Department released Captain Emory S. Land (C.C.) for a limited time to act as vice president. Captain Land, an M.I.T. graduate, former Assistant Chief of the Bureau of Aeronautics, holder of the Navy Cross for meritorious service, had been connected with the Navy Department for thirty years. Under his executive guidance, the Fund has successfully undertaken a multitude of intricate engineering problems which, without his knowledge and experience, would have been seriously handicapped. Major General Goethals, a member of the Fund's directorate and builder of the Panama Canal, died during the year. Charles A. Lindbergh was appointed technical adviser to the Fund.

With the limitation of activities on the part of the Commercial Development group, the Education and Scientific Research groups expanded their scope of operations. The Education group endeavored to further the study of aviation and aeronautics in the school and college by (a) popularizing aviation in the schools, (b) special lectures at the universities, (c) establishment of schools of aeronautics at certain universities, (d) donation of equipment, (e) granting of fellowships to selected students, (f) instruction in aeronautical trades, (g) granting prizes for papers on aeronautical subjects by college students and (h) publication of bulletins and special texts. In pursuance of this policy, the Fund granted large sums to the University of Washington, University of Michigan, Massachusetts Institute of Technology, Stanford University, and California Institute of Technology. During 1928 the Fund donated $290,000 to the University of Washington for the purpose of constructing an aeronautics building, and the total grants to educational institutions for the year were $1,200,000.

In 1929 this widespread philanthropy continued on a similar scale. It was decided to grant the City of Akron and the California Institute of Technology a sum of $250,000 to establish an Airship Institute; the Library of Congress received $140,000 to organize a complete aeronautical research library; $25,000 was appropriated to the Fund's committee on Elementary and Secondary Education; $30,000 went to Syracuse University, and $10,000 went to each of four European aeronautical societies.

In Scientific Research, however, the Fund's activities were even more expensive and more complicated. The Safe Aircraft Competition had been announced in 1927, and in both Europe and America some of the best aeronautical engineers undertook to design a superior airplane that might win the first prize of $100,000. The fog-flying experiments were under way at Mitchel Field with the aid of specially-designed apparatus of Lieut. James Doolittle, loaned by the Army. Professor William Brown of M.I.T. was appointed as Doolittle's technical assistant. Throughout the latter part of 1927 and 1928 these two projects were gradually working toward the successful climax of each which the world witnessed in 1929 and both of which were described at length and in detail in previous issues of AERO DIGEST.

Most of the Fund's aims had been realized by the summer of 1929. When it was first organized, Harry Guggenheim stated that it had no other purpose than to assist in making air transportation safe, popular and regularly avail-

(*Continued on next page*)

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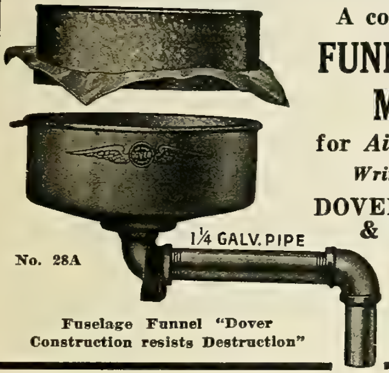

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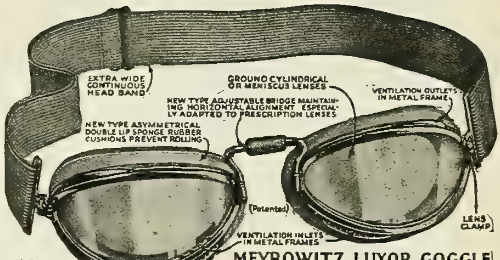
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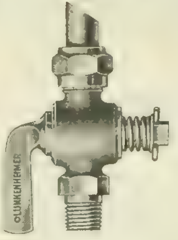

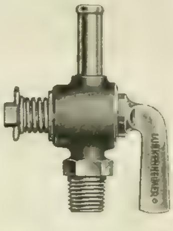

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Fig. 1686, 3-8" Male Pipe and 1-2" Outside Diameter Tube
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Fig. 1669, 3-8" Male Pipe and 1-2" Inside Diameter Hose

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LOS ANGELES

(Continued from preceding page)

able. Within the last few weeks a bulletin was issued from the Fund's headquarters which says, among other things:

"Certainly air transportation is now regularly available, and its popularity is definitely assured. Also, under the right conditions, transportation by air can be as safe as transportation by rail, steamship or motor vehicle. Hitherto, there have been two drawbacks to universal flying; lack of an aerodynamically safe airplane, and the inability to fly safely through fog. In its Safe Aircraft Competition, the Fund has pointed the way to the development of an aerodynamically safe plane, and the results of the Competition at Mitchel Field in the next month will offer to the public a new realization of the inherent safety possible in flying. In its Full Flight Fog Laboratory the Fund has demonstrated the principle of safe flying and landing in fog. Private capital, which is now available in almost unlimited amounts for aviation enterprises, will, and properly should, carry on these fundamental developments to their commercial application."

The bulletin continued with the statement that the Fund, believing that its objects have been attained, would discontinue its activities after December 31st. In order to finish the numerous odd jobs remaining, Daniel Guggenheim donated another $500,000 to the Fund's treasury, making his complete contribution an even three million.

In summarizing the activities of the various groups, the widespread application of the Fund's resources is the most impressive feature. It ranged from the million-dollar endowments of educational institutions and the international participation in the Safe Aircraft Competition, to publishing bulletins on such subjects as the causes and treatment of air sickness. A campaign to interest towns to place markers on their roofs was carried through to a successful conclusion, and a nation-wide weather-reporting service was begun and is now well under way. The Fund sponsored the first National Safety Conference for Aeronautics, and published many pamphlets on various technical and popular phases of aircraft activity.

The helpful influence of the Fund on future commercial aviation will be felt for years. It provided the incentive to accomplishment, donated equipment for the proper execution of the work, helped beginning companies to remain in operation, and founded great schools of science which will supply the industry with trained men. It introduced the airplane to the public as a commercial vehicle.

SELLING AIRPLANES ABROAD

(Continued from page 65)

get instructions or employ someone to fly for him. Because the number of available pilots in most countries is limited, progress in airplane sales is necessarily going to be slow. But as the impression that flying is difficult is destroyed, then will there be more and more persons venturing to take instructions, to learn, to their amazement, that flying isn't really much more difficult than learning to drive an automobile. And as this thought receives general acceptance, the rich sales territories lying outside the boundaries of the United States will furnish plenty of business to keep our American aircraft factories busy during the normally dull period. Which means, of course, the reducing of the peaks and valleys of production, with lower costs and lower selling prices. And that, automatically, brings into the market a great percentage of the population who can afford to own planes.

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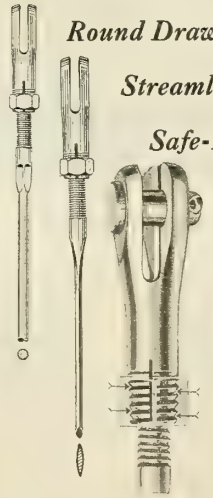

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IF the aircraft manufacturers will accept the scheme as designed for their craft by Titanine, Inc., and *IF* they will apply it as per the instructions given, Titanine, Inc., will guarantee their surfaces.

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COMPETITION IN THE WORLD MARKET

(*Continued from page* 53)

two and three-seater types, as will the new executive type F.13 designed solely for foreign sale.

The Netherlands, Italy, Switzerland and Czechoslovakia are producing aircraft some of which are exported. An illustration accompanying this article shows a Dutch Fokker equipped with American landing gear struts, and American wheel brakes. Table 3 shows to what extent parts and accessories for aircraft are being exported. The figures indicate that provision is being made for servicing American airplanes which are in foreign operation. Also, in view of the fact that more countries buy our parts than our complete aircraft, there is evidence that foreign producers are finding our technical items, instruments and parachutes not only efficient, but in some instances not available from local sources.

Switzerland and Italy have some military aircraft in Colombia and Ecuador, respectively, but have made no appreciable export shipments. Italy is the only European country using American aircraft on an intra-European airline. We in turn are using Italian planes in this country and soon will have them manufactured here, to a considerable extent, under license.

A recent visitor at my office in Washington exemplified the status of our aeronautic products in the world market. This gentleman was the director of a European airline. He wanted to purchase some engines of the same type employed on the American tri-engined plane which recently visited his country. On his next visit I should not be surprised if he expresses an active interest in complete aircraft.

THE FUTURE OF AERONAUTIC EXPORTS

(*Continued from page* 59)

those in South America and the Far East, consider aircraft primarily in its military aspect and only incidentally for other purposes. Not until after the establishment of sound, properly conducted transport companies carrying passengers for hire—passengers who are convinced of the superior speed, safety and convenience of aircraft—can a large demand for planes for individual or business use be developed in foreign countries. This may be a matter of two or three years.

In the meantime, while we must operate under the handicap of relatively limited production, with its correspondingly higher cost, it is gratifying to know that American aircraft are more than holding their own in the export field.

WHAT AMERICAN AVIATION OFFERS THE FOREIGN BUYER

(*Continued from page 77*)

Partly because they were ambitious to make profits and partly from an American desire to get into mass production, the manufacturers in the aviation industry began to consider the export field. They found that they could expect a very healthy volume of business. For reasons already stated, foreign buyers of airplanes and engines were well disposed to consider a new source of supply.

Because of the fallacies already apparent in the system of selling only obsolete or obsolescent material for export, the American manufacturers were saved from this pitfall and breeder of bad will. Moreover, they had only new equipment to sell.

Gradually, a sound business has been established, increasing every year. It now appears that American avia-

(*Continued on next page*)

MAINTAINING a leadership that has distinguished it from all others, AMERILAC AIRCRAFT LACQUER is acclaimed the most durable and enhancing airplane finish.

Both manufacturer and individual will find it of benefit to select AMERILAC as his airplane finish because of these facts: 1. No cracking. 2. No peeling. 3. Ease of application. 4. Filling and covering properties. 5. Superiority and uniformity.

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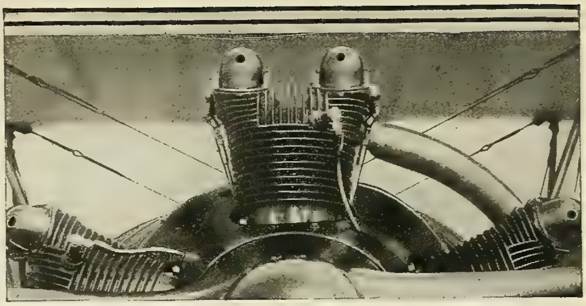
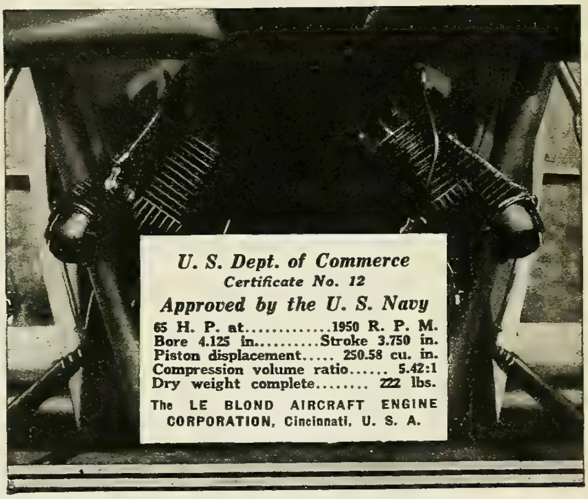


The Le Blond "60"



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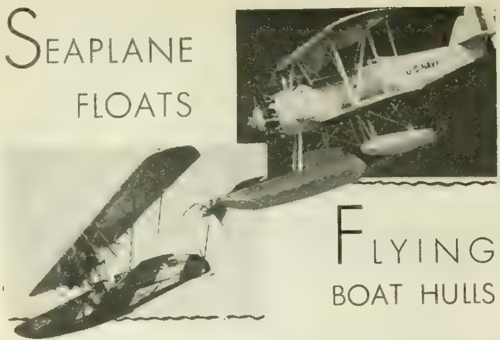

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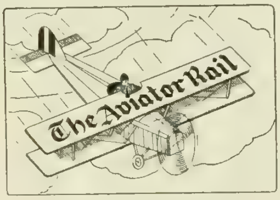

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(Continued from preceding page)

tion has made progress in the foreign field, this including the South and Central American countries, Cuba, and the Far East.

American aviation has practiced fine ideals in this progress. Each American company is competing with every other. Therefore, the constant purpose is to design, build and sell the best, and to retain customers by giving superior service.

In the military field, the American manufacturer is receiving the finest kind of coöperation from the Government. Soon after a new type has been tested and accepted by the War Department or the Navy Bureau of Aeronautics, permission is usually granted to sell the product abroad. Thus, the industry can go forward with clear conscience, for it can sell its latest types to foreign customers.

According to recent figures supplied by the Bureau of Foreign and Domestic Commerce, the United States this year will have won an important share of the export aeronautic trade. In the estimates, it appears that twenty-four per cent of all planes and engines exported this year will be of American origin. Furthermore, indications are that this will increase to forty per cent in 1930. Considering the industry's late start in this field, the results prove that our products are appreciated, that our sales organizations are good and that our service is satisfactory.

In many of the countries to which American aeronautical products are exported, the leaders of our industry have won confidence to an extraordinary degree. In addition to the sale of equipment, our companies have been urged strongly to send in executives to help establish civil airways and to open schools according to the highest standards of American flying instruction.

To sum the export situation up, it becomes increasingly apparent that we have not only cause for optimism as to the future, but real reason to be proud of our business methods in the past. Design, manufacture and price are all important considerations, but service is the common denominator in success. American aviation has all the facilities to give service, and, so far, every disposition to employ it to the fullest extent.

"GO SOUTH, YOUNG MAN!"

(Continued from page 58)

South, where the highest peaks of the Andes have snow on their tops the year 'round, like a man with dandruff; where the llama and the alpaca bleat softly to their mates in the cool of the evening, discussing the price of wool; where the armadillo and the tapir hunt the elusive tamale, and the vast herds of laughing hidalgoes browse contentedly on the gringoes; where the gentle matador sings a song of love, and where the lonely pampas croons its sad, sweet melody while a passing boa-constrictor slithers along taking an occasional pensive bite out of an onion.

But with all the aviation development that has been accomplished in South America, with all that is certain to be accomplished within the next few years, let us not forget the pilots to whose pioneering efforts these developments must be credited. Wherever the industry goes, wherever an airline has been started, it is the pioneering work of the individual pilots that has been responsible for the start. Flying over uncharted countries, encountering difficulties and dangers innumerable, these adventurous and cheerful spirits led the way. With admiration for their pioneering work, it is comparatively easy now for us to follow along the path that they have shown us.

Go South, young man! Go South!

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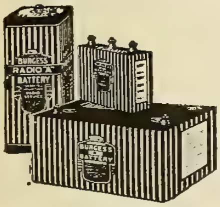

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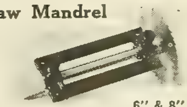

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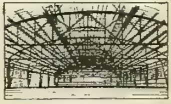

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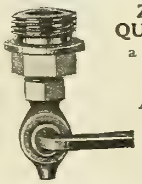

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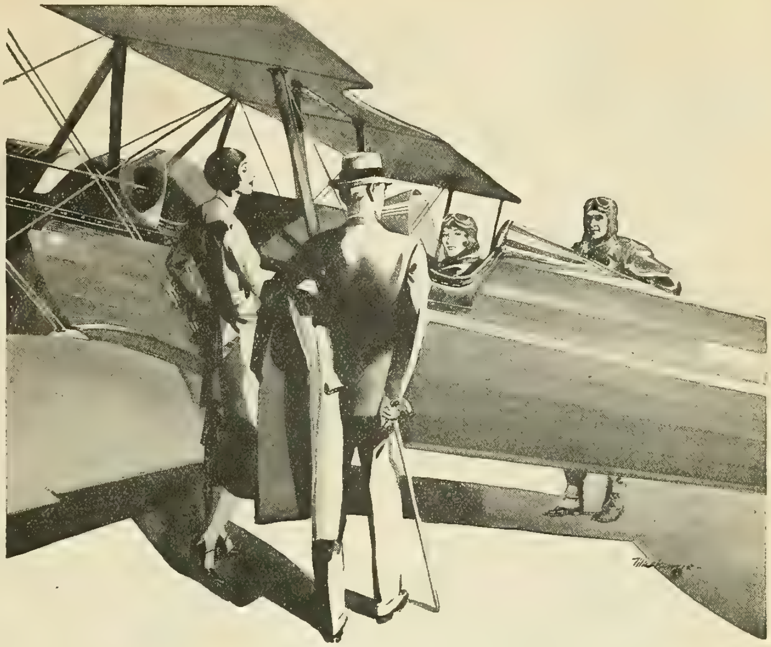
WOMEN HAVE EARNED THEIR RIGHT TO WINGS . . . . .



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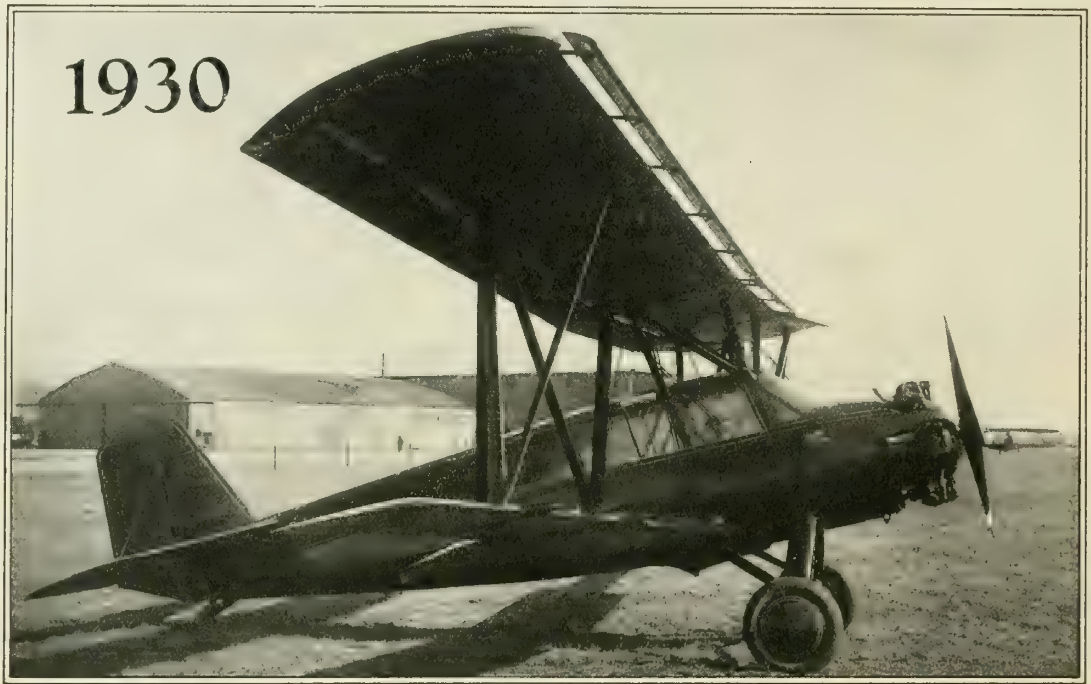

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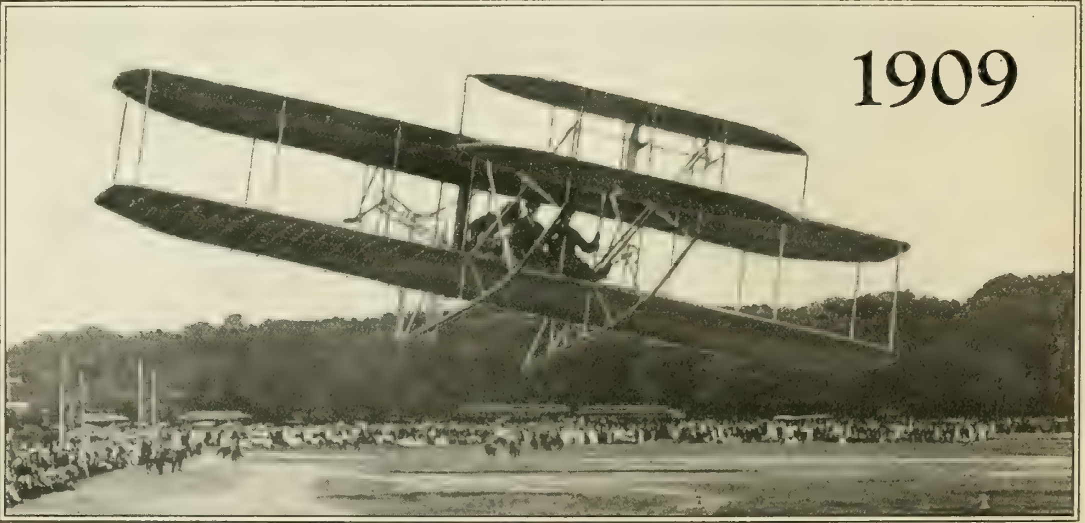

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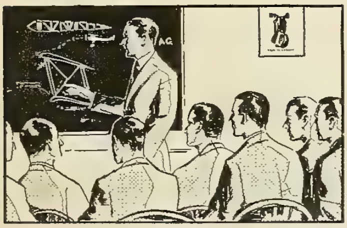

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"We need a young man to help service ships under the supervision of licensed pilots and mechanics. We will pay him a small salary with flight instruction whenever possible . . . raising him from time to time as he becomes more proficient. Please send a man."

MAN LOCATED

When our Employment Manager received Mr. Hathaway's letter he got in touch with one of our graduates whom he thought would fit the place — Robert G. Baldwin. Baldwin reported promptly to the Tred Avon Flying Service, and a few days later wrote us:

"Thanks to your letter of introduction, I got the job. Your Employment Department is just as efficient as your Course is thorough, and I only hope now that I will be able to make good here and reflect credit on your school. Thank you for giving me this opportunity."

MAN MADE GOOD

A few months later we received word from Mr. Hathaway that Baldwin was doing very well. The results showed that our Employment Department had picked the right man for the place, as this last letter from the Tred Avon Flying Service goes to indicate.

"We employed your student, Robert G. Baldwin, whom you recommended to us, and we wish to let you know that he is doing very well. We are more than satisfied, for he is a steady worker, learns quickly, and, we are convinced, will make a good pilot."

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2. Speed: The *faster* a ship can travel with full load, the higher its figure of merit . . . because its practical utility is thereby improved.

3. Landing Time: The *shorter* the distance in which a ship comes to a dead stop, the higher its figure of merit...because its capability in emergency landings is greater.

4. Take-Off Time: The *quicker* a ship leaves the ground, the higher its figure of merit ...because of its greater ability to get out of small fields.

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LEFT—The Buhl Senior Airsedan is an eight-place dual-control plane, priced at $18,500 with the Wasp engine and $19,500 with the Hornet or Cyclone.

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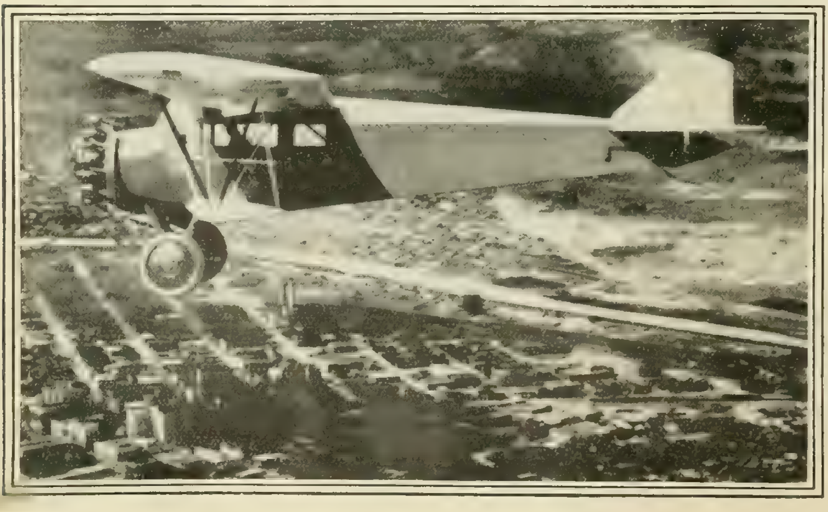
LEFT—The Buhl Standard Airsedan is a six-place, dual-control plane, priced at $13,500 with the J-6 Wright Whirlwind engine.

* * * *



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LEFT—The Buhl Sport Airsedan is a three-place, dual-control plane priced at $12,000 with the J-6 Wright Whirlwind engine and $11,000 with the J-5.

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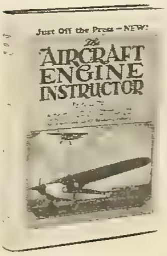

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Kinner Airplane & Motor Corp.
Lambert Aircraft Co.
(formerly Velie Motors Corp.)
LeBlond Aircraft Engine Co.
Lycoming Motor
MacClatchie Manufacturing Co.
Michigan Aero Engine Corp.
Navy Department
Pratt & Whitney Aircraft
O. E. Szekely Corp.
War Dept.—Air Corps
Warner Aircraft Corp.
Wright Aero Corp.

STROMBERG
growing with aviation

Years ago when aviation was in the experimental stage Stromberg was experimenting, too, with an aircraft carburetor. One that would be dependable, light. That would supply the proper fuel mixture to the engine at all speeds, in all positions—efficiently and economically.

Such a carburetor was developed. The difficulties of propeller blast and upside down flying were overcome. A dependable, durable, economical carburetor was designed and built.

The aviation world quickly recognized the remarkably fine performance of Stromberg carburetors. With the result that over 90% of American aircraft flying today are Stromberg equipped. And—as aviation grows, and new planes and new engines are developed, inevitably builders turn to Stromberg for the solution of their carbureting problems.

STROMBERG MOTOR DEVICES COMPANY
58-68 E. Twenty-fifth Street, Chicago, Ill.
(Division of Bendix Aviation Corporation)

Factory Branches
New York, N. Y. Detroit, Mich. Minneapolis, Minn.
Kansas City, Mo. London, England

It's Flying Time All the Time . . .

In LOS ANGELES COUNTY

Climatic conditions in Southern California give tremendous advantages to the aircraft manufacturer here. There is no such thing as a closed season on flying. Thunder storms are extremely rare—snowstorms unknown. The average summer temperature (July, August and September, 1929) was 73°; the average winter temperature (January, February and March) was 56°. There were only ten days with ¼ inch, or more, of rain, during the year. The average hourly wind velocity was 5 M. P. H. The highest wind velocity during the year was 24 M.P.H. There were 359 days with sunshine.

As applied to the aircraft industry in Los Angeles County, these factors mean uninterrupted operation and additional profits for the manufacturer.

Los Angeles County has more licensed pilots and more identified aircraft than any other county in the United States.

. . . .

55 Airports and landing fields.

. . . .

25 Aviation Schools.

. . . .

Approximately 2000 registered students in training.

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Ideal living conditions for labor.

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Congenial, Open Shop working conditions.

. . . .

Low Building and maintenance costs.

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Industrial power, natural gas and abundant water at low cost.

Air-Minded
LOS ANGELES
COUNTY

Interesting facts and figures concerning the aircraft industry and its opportunities in Los Angeles County will be sent upon request to Industrial Department, Los Angeles Chamber of Commerce.

MOHAWK *adopts* HEYWOOD STARTER *as standard equipment*

Mohawk—the well known light, low winged monoplane has adopted the well known Heywood Starter as standard equipment on all ships.

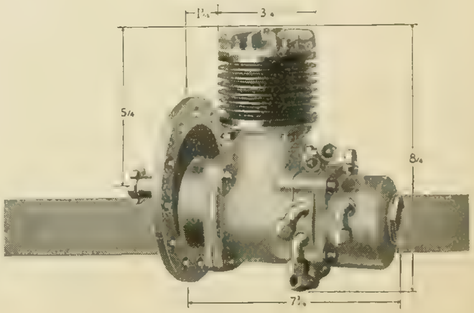
The selection of Heywood by Mohawk is in line with this company's rigid policy of choosing only the most dependable equipment on the market.

The Heywood Injection Starter has gained its splendid reputation because it starts instantly under all conditions —is light in weight—has few moving parts and is as simple in operation as in design.

There should be a Heywood on your ship. Send for complete details.

SKY SPECIALTIES CORPORATION
3651 Hart Avenue - - Detroit, Michigan

START~ER
by
HEYWOOD



PORTERFIELD MAKES IT EASY FOR YOU TO LEARN TO FLY . . . .

PIONEER FLYING SCHOOL OPERATOR ORIGINATES "PAY-AS-YOU-FLY" CHAIN OF AVIATION SCHOOLS

Throughout the United States, the name PORTERFIELD for years has been synonymous with flying schools and airplanes. Today, it has taken on a new meaning; it has revolutionized the flying school business; it has introduced a NEW way by which thousands can realize success in aviation.

Porterfield Aviation Interests, Inc., a subsidiary of the American Eagle Aircraft Corp., is forming a chain of "Pay-As-You-Fly" Aviation Schools—bringing flying instructions to you right at your home doorstep.

Here at last, is the ideal way to learn to fly. You fly when you have the time—not at the dictation of a school teacher. Licensed new production American Eagle planes and licensed pilots are always available.

Flight instruction tickets in book form are sold at surprisingly low rates. Tickets are removed by instructors as time is used. In 10-hour quantities, flight instruction time rates are reduced 10 per cent. Solo time is offered at further reduced rates.

Today there are five of these schools, and there will be more than two score when the summer flying season opens. Municipalities, anxious to boast an active airport, are enlisting the aid of Porterfield Aviation Interests, Inc., in bringing aeronautics to their midsts.

Get in touch with your nearest "Pay-As-You-Fly" aviation school of the Porterfield Aviation Interests, Inc., chain. Do it today!

PORTERFIELD
AVIATION INTERESTS, Inc.

CHAIN OF AIRPORTS AND FLYING SCHOOLS

Porterfield Flying School, Inc., P.O. Box 298, Kansas City, Kas.

Atchison, Kansas, division of Porterfield Flying School, Inc.

American Eagle Aircraft Corporation of Texas, Hangar No. 6, Love Field, Dallas, Texas.

Coffeyville Airways Corp., Coffeyville, Kansas.

Texarkana Flying Service, Texarkana, Texas.

Pittsburg Airways, Inc., Pittsburg, Kansas.

Carthage Airways, Inc., Carthage, Mo.

Porterfield Aviation Interests, Inc.,
Fairfax Airport, P. O. Box 298,
Kansas City, Kansas

I am interested in the "Pay-As-You-Fly Plan." Please send me full details.

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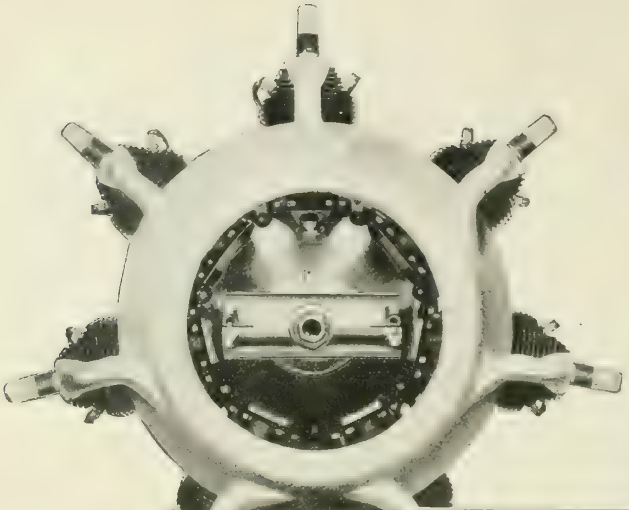
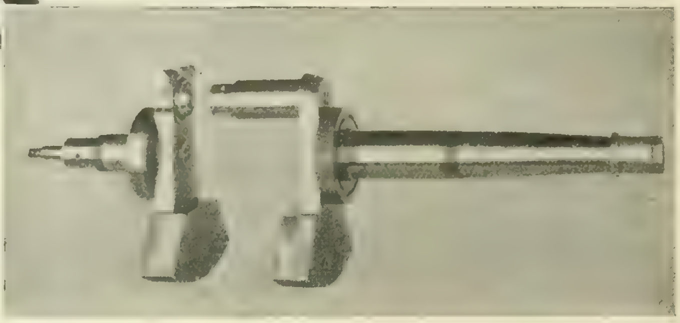
Address ______________________

City ______________ State ______________



Dependable materials are the best assurance of dependable performance

Seven cylinder airplane engine, 165 H.P., manufacturer's guaranteed rating. Mfd. by COMET ENGINE CORPORATION, *Madison, Wis. Nickel Alloy Steel two-piece crankshaft used in Comet engines is shown below.*



COMET...

another aircraft engine using dependable *Nickel Alloy Steel parts*

DURING its two years of service history, the Comet engine has proved particularly well suited to the needs of private owners and training schools, incorporating in its design, features of safety in operation and simplicity in maintenance.

To enhance the safety factor the manufacturers of Comet engines have taken full advantage of the added strength afforded by Nickel Steels. The crankshaft is made of Nickel Chrome Molybdenum Steel. Nickel Steel is used for the cylinder studs, while the connecting rods and practically all other moving parts are Nickel Chromium Steel.

The dependable uniformity of the physical properties of Nickel Alloy Steel is one of the reasons why practically all leading manufacturers of airplane engines, both in America and Europe, have adopted these alloy steels for highly stressed parts which must possess utmost dependability without excessive weight.

Nickel
FOR ALLOY STEEL

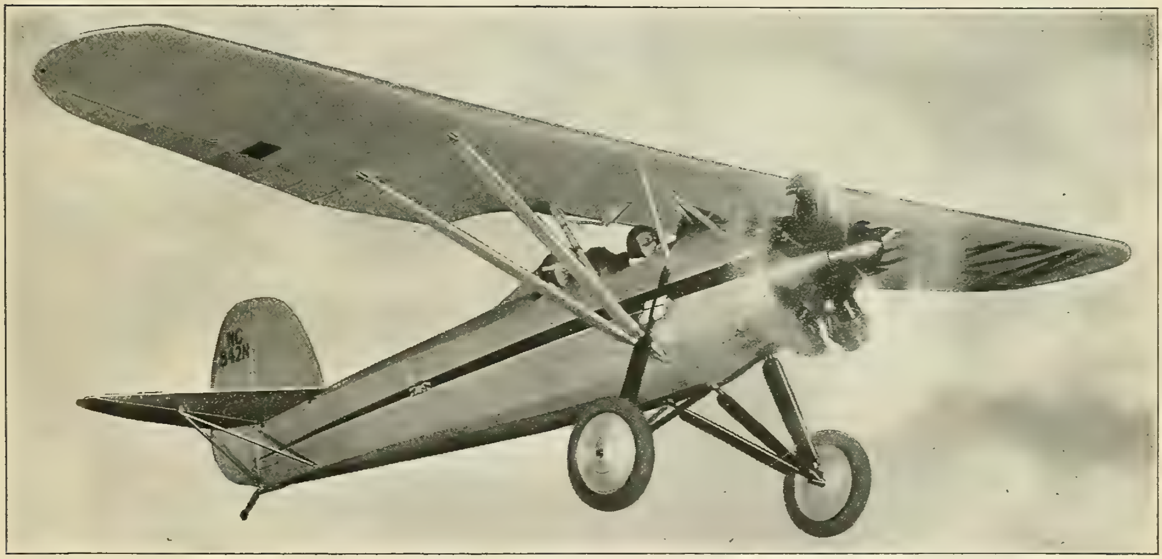
"SEND FOR BUYERS' GUIDE TO NICKEL ALLOY STEEL PRODUCTS"

INCO NICKEL THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y. INCO NICKEL

DAVIS
AIRCRAFT

the FASTEST Kinner-motored Plane in AMERICA

Manufactured under Department of
Commerce Approved Type Certificate



TOP SPEED of 125 miles an hour—cruising speed of an easy 105; 5,000 foot climb in five minutes; performance approximating that of a pursuit plane; stability in rough weather excelling many larger and heavier planes; they're *all* combined in the Davis D1-K —*the fastest Kinner-motored plane in America.*

Such performance at so moderate a price, and at such low operating costs, *is* decidedly out of the ordinary.

PERFORMANCE (*Actual*)

Type	D1—Le Blond 60	D1-K—Kinner 90
Service Ceiling	10,000 feet	14,000 feet
High Speed	101 M. P. H.	125 M. P. H.
Landing Speed	38 M. P. H.	40 M. P. H.
Cruising Speed	85 M. P. H.	105 M. P. H.
Climb	700 ft. per min.	1200 ft. per min.
Fuel Consumption at Cruising Range	4 1/2 gal. per hr.	6 gal per hr.
Cruising Range	300 miles	400 miles
Price Complete, Fly-away	$3285	$4185

But the Davis D1-K is *not* an ordinary plane, and can *not* be judged from previous experience. In its fineness of design, its unique wing construction, and structural sturdiness it has established a new standard for the light, economical two-place plane.

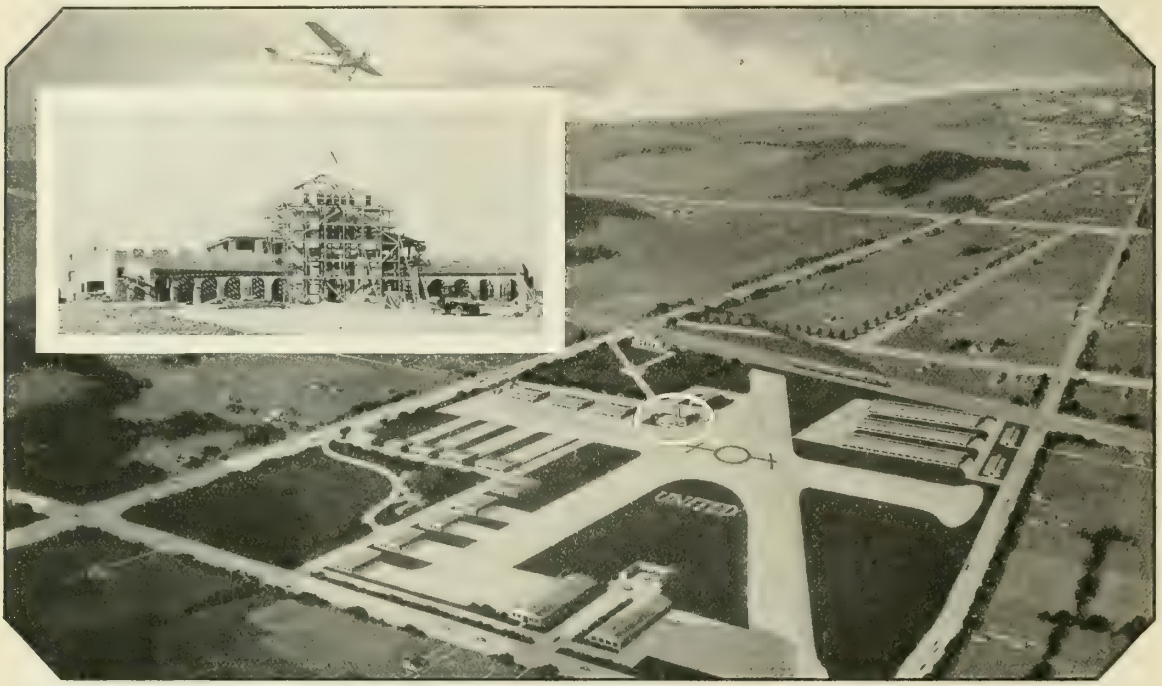
Here is *speed* with economy for the business man who flies his own plane to save time; sparkling performance for the sportsman pilot; the stability essential in a training plane. Before you buy, investigate—and fly—the Davis D-K1.

Davis Aircraft Corporation, Richmond, Indiana

D1-K

DAVIS MONOPLANE

"Sold under licenses covering all of the patents owned by members of the Manufacturers Aircraft Association, Inc."



United Airport of Boeing System at Los Angeles. Layout, design and construction by Austin. Inset shows air depot practically completed.

AN ADVERTISEMENT TO 1,100 AIR-CONSCIOUS CITIES

FROM no less an authority than the United States Department of Commerce comes the statement that 1,100 cities are organizing committees and otherwise preparing for construction of airports to gain the advantages of air commerce.

If yours is one of these air-conscious cities . . . if you are in any way interested in the aviation program of your municipality or contemplating like development for your own organization . . . Austin offers its experience as a definite aid in the planning and construction.

For more than a decade, Austin has been active in the field of aviation. Selection of sites, design and construction of complete airports and terminals, hangars and industrial plants for the manufacture of aircraft and accessories . . . all of these have been a part of Austin's work.

If your city or your business is to play a vital part in the nation-wide development of aeronautical facilities, let the first step be to secure an Austin Survey and Report. This is the sound and economical way of planning your project, for this unusual Austin service presents the findings of Austin Airport Engineers in a manner that clearly points out the proper course of procedure to assure maximum return on your airport investment.

Any of the Austin offices listed below are at your call. 'Phone, wire, or use the convenient memo below.

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Airport Engineers and Builders • Cleveland

New York Chicago Philadelphia Newark Detroit Cincinnati Pittsburgh St. Louis Seattle
Portland Phoenix The Austin Company of California Ltd.: Los Angeles, Oakland and San Francisco
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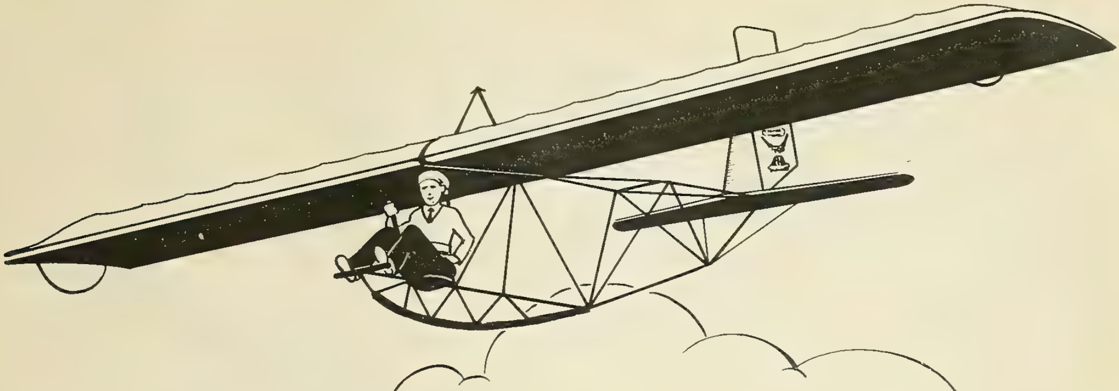
Position............ Firm............ City............ A D 2-30



It's here!

A Sturdy High-lift Glider.

— by a leading airplane manufacturer.

THE Alexander primary type glider is the first to be offered by an established airplane manufacturer for flight training. It is built rugged to stand hard knocks safely and with a minimum of upkeep.

In performance this glider is a high altitude instruction unit. Its high lift wings have made the tests conducted at Colorado Springs, over 6,000 feet above sea level, successful. Its flying ability at lower altitudes is even better.

The Alexander glider is being produced after an exhaustive study of motorless flight by Alexander engineers. All manufacturing facilities of this organization have been bent toward making a perfectly balanced glider built to airplane standards. Its wings are designed to a safety factor of 14, meaning that they will stand a stress 14 times greater than encountered in normal flight. The fuselage is of welded steel tubing. Complete manufacturing facilities enable the company to build this glider along quality lines at a price that would be impossible were not such facilities available.

In addition, glider owners have the benefit of the nation-wide Alexander factory service organization of 176 distributors and dealers. There is one near you to help you get the most utility from your glider.

The Alexander Aircraft Company has a club plan, ideal for glider ownership. Twenty members, contributing $20 each, can purchase a glider and learn to fly for about the cost each of one hour of motored flight instruction.

Write for the folder telling about the glider and the club organization.

Order Your Glider Now

$375.00

F.O.B. FACTORY

A deposit of $100 clinches an order. Gliders will be shipped in the order that deposits are received and as rapidly as the factory can manufacture them. Assure early delivery by sending your deposit now.

ALEXANDER AIRCRAFT CO.

403 Alexander Industries Bldg.,
Colorado Springs, Colo.

Please send me your folder describing the Alexander glider and telling how to form a glider club.

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★ BUSINESS MEN ARE CHOOSING

STEARMANS

★ Watch Fenestra and the other
Stearman owners during 1930

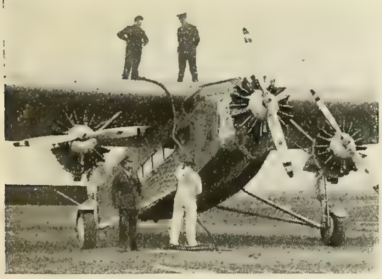
UNDOUBTEDLY a tribute to Stearman—the fact that aggressive business men, such as Mr. A. W. Sowdon of Fenestra (The Detroit Steel Products Co.), chose a Stearman for his 1930 business task. For business, the Stearman is well suited. All pilots say so, too—short landings, quick take-offs—climbs nicely with a heavy load. Just a matter of a few hours—for a trip from Dallas out to the oil wells—from the factory (Detroit) to a hot prospect in Des Moines—from Mexico City to Laredo—from New York across the Sound to New Haven—Stearman is the choice. Business Speedster or Junior Speedmail series is adaptable to sport or commercial flight. Wire or write us at the factory—see us in Section G, Building B at the International Aircraft Exposition, St. Louis, February 15 to 23, where our attractive sales franchise for 1930 will be explained. STEARMAN AIRCRAFT CO., WICHITA, KANSAS, Division of United Aircraft and Transport Company.

STEARMAN
AIRCRAFT COMPANY
WICHITA KANSAS

A group of student pilots watching the new tri-motored all-metal Ford training ship as it is flying low over Parks Airport.

Now MORE THAN EVER BEFORE YOU NEED PARKS TRAINING

THE day of the half-baked, poorly trained pilot in commercial aviation is GONE FOREVER. It will never return. Today aviation wants only the properly trained flyer—the man to whom passengers, mail and precious cargoes of freight and express can be entrusted safely.



It wants pilots with ability and judgment—pilots who have *learned the right way*—pilots of the Parks-trained kind.

Parks Air College has consistently given, and continues to offer you, *tomorrow's training today.* It was Parks that first gave all its students—Private, Limited Commercial or Transport — a *complete Transport Pilot's Ground Course.* It was Parks that first gave its transport students night flying instruction with *ten hours of night solo.* It was Parks that first offered young America a flying course as carefully planned and taught as the most systematic university course.

Today Parks Air College continues to blaze the way with new refinements. A new Ryan brougham with 300-horsepower Whirlwind engine—more of the speedy Parks Dispatcher biplanes with their sturdy yet powerful radial engines—these are but two features of the improvements which are added almost daily by Parks to its student facilities.

Parks has brought to its magnificent fleet of training planes a ***Wasp-powered Ford monoplane***—an exact duplicate of the huge air-liners that carry passengers daily on America's transport routes—a palace car of the air propelled by 1300 horsepower. Upon this leviathan of the air —***the only tri-motored plane in America used exclusively for student instruction***—every Parks transport student gets eight hours instruction including five hours in complete command of the ship!

Let us send you "Skyward Ho!", the fascinating Parks booklet with its special message about you and your place in aviation. The coupon below offers you an opportunity that you *can't afford to pass by.* Get it in the mail today!

Parks Air College was one of the first to be licensed by the U. S. Department of Commerce as a fully accredited transport school.

PARKS AIR COLLEGE
(Division of Detroit Aircraft Corporation)
266 Missouri Theatre Building
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A FEW interesting hours in the company of these books will give *you* the invaluable knowledge it took authorities years to learn; for this famous series of accurate, practical Aeronautical books was prepared by a large group of the most famous experts in the world. With the editorial aid of Colonel Chandler—well known author, high ranking officer, and airplane pilot since 1911—men like Klemin, Monteith, Diehl, Clark, and almost a score of other prominent authorities have here set down in plain black and white—in easy, readable, *interesting* English, the cream of their expert knowledge.

You will find this vast knowledge written in short titled paragraphs — you will find handsome illustrations and amazingly simple charts to drive home the facts, and make everything absolutely clear. You will find lists of definitions, methods of work, tricks of the trade—priceless knowledge that can increase your efficiency in your present job and prepare you for a better one.

In many Flying Schools these books are standard. In the great Universities, Professors of Aeronautics rely on them for authentic information. Army commanders recommend them. Thousands of men all over the country are using them to get the practical information they need to fill their jobs and to demand higher pay. You, too, should have these books. They will give you expert knowledge that is vital to your success . . . . a grasp of Aviation that can lift you up out of the rut of a routine job and put you into a class where salary and future are unlimited.

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February 7th to 15th

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1 "Simple Aerodynamics and the Airplane" is the most complete beginner's book available. It was developed after eight years of teaching experience at West Point, and is intended to give the beginner in Aviation a thorough understanding of all branches of aeronautics. Over 200 photographs and drawings make everything clear—how planes are designed, how airfoils are tested and selected, details of parasite resistance, design of propellers, forces acting on a complete airplane, stability, control surfaces, performance, dynamic loads, materials and construction, all kinds of equipment—parachutes, cameras, radio outfits—navigation and flying instruments, and much more. Aero dictionary at back explains all terms. Interesting problems in design and navigation make it easy for you to test your knowledge. The author of this book, Lt. Monteith, is now Chief Engineer for the Boeing Airplane Co., and speaks with authority—you may be sure this book is both practical and authentic. Postpaid $4.50.

FOR ENGINEERS

2 "Engineering Aerodynamics" by Lt. Diehl, Construction Corps, U. S. Navy, was prepared to meet the definite need for more practical information on aerodynamics. The information supplied in this book can be applied directly to the design of aircraft. Data on wing sections, model tests, parasite resistance, control surface design, engines and propellers, performance calculations, aspect ratio and drag, reductions of observed performance to standard conditions, and much other material, is presented in the shape of practical working diagrams and graphs from which factors, constants, and ratios needed by the designer may be easily derived. A great deal of the information contained in this book is original—most of it is new—elementary material which can be easily obtained in other books is not discussed. Every designer and advanced student will find this volume indispensable. Postpaid $7.00.

FOR STUDENTS AND DESIGNERS

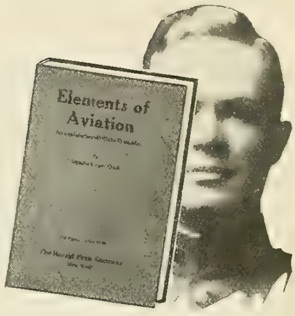
3 "Airplane Stress Analysis" by Alexander Klemin shows you exactly what steps to take—and how to take them—in preparing stress analysis data for the Department of Commerce. Klemin gives you a review of applied mechanics on which to build. He cuts out the higher mathematics to a surprising degree. Tables for all stresses are included: These cover steel, wood, all kinds of tubing, hard wire, steel cable, tie-rods, rivets, bolts, and pins, duralumin sheet, and all other materials commonly used in the construction of commercial aircraft. Altogether there are 105 diagrams and 23 tables. This book is complete enough for use in analysis of any average-size ship, yet simple enough to serve as a beginner's text for students. Postpaid $7.00.

A REAL BOOK FOR MECHANICS

4 Mechanics on the job, and men who want to qualify for this important work will find all the practical details of their jobs covered fully in the "Airplane Mechanics Rigging Handbook." Col. Hartz and Lt. Hall, co-authors of this book have had years of experience in Army and civilian flying schools. They know what a mechanic should be, what he should do, what points are most apt to give him trouble. In the handbook they have concentrated on these practical subjects, eliminating nearly all mathematics and theory, and dealing with the things a good mechanic has to understand—care and inspection of airplanes, methods of rigging, truing up fuselage and center section, adjusting angle of incidence and dihedral, installing and correcting compasses and other flying instruments—keeping the ship in perfect flying shape. Practical information about wire, wood, fabric, metal parts, dope, etc. Over six hundred review questions give you knowledge you need to pass Department of Commerce examinations. Postpaid $3.50.

FOR BEGINNERS

5 "Elements of Aviation" by Colonel Clark is an unusual book that tells you more than WHAT an airplane does—it tells you WHY. The author designed the wing on the "Spirit of St. Louis," and is thoroughly qualified to make the principles of flight perfectly clear. By the use of a few simple mechanical illustrations he shows you how to account for everything an airplane can do. He explains air and airfoils, effects of airflow on the wing, stability and control, propeller effects, powered flight, atmosphere and effects of altitude, construction of airplanes, and their design. There are twenty-four illustrations, and an unusual dictionary of Aviation terms. No matter what branch of Aviation you want to enter, this book gives you information essential to the job. It is practical, fundamental, and easy to grasp. Postpaid $3.00.



Author: *Former Chief Aeronautical Engineer of the U. S. Army*

IF YOU WANT TO BE A PILOT

6 The advice of Major Byron Q. Jones in his famous pilot's manual, "Practical Flying," will start you off on the right track. It contains useful flying information that you could not learn otherwise, save by long, and perhaps costly experience in the air. It explains in detail the actual technique of all kinds of maneuvers, the take-off, the initial climb, turns, banks, how to avoid stalls and spins—how to get out of a spin if you fall into one. The author of this practical airman's guide is known as the first American pilot to deliberately spin his ship. By trying it, he learned the right way to recover. As a result of his own practical flying under all sorts of conditions, his book on "Practical Flying" is recognized by students and experienced pilots alike as an authoritative course of instruction. Postpaid $3.00.

Author: *Former Chief of Aviation Training, U. S. Army*

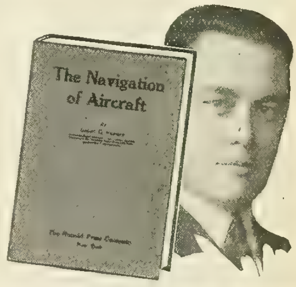
FOR PILOTS, STUDENTS AND EXECUTIVES

7 Any "cross-country" man will tell you that you MUST know the weather, for the weather decides how far you will fly and how safely you'll come down. "Aeronautical Meterology" by W. R. Gregg, Senior Aerologist of the Weather Bureau, gives you the information you need to read weather maps, tells you what to expect when you see weather signs, gives you practical information about force and direction of winds at various altitudes—about fogs, visibility, storms, clouds, and air in general. Vitally interesting, handsomely illustrated, useful every day of the year. Postpaid $2.50.

Author: *Senior Aerologist, U. S. Weather Bureau*

A NECESSITY FOR TRANSPORT PILOTS

8 Here at last is a book on aviation that gives gives you a proper understanding of piloting, dead reckoning, and aerial astronomy! There is nothing like it available anywhere. It gives you just the information you need—nothing more or less—about maps, charts, instruments, drift indicators, compass compensation, dead reckoning, determining the wind, radio aids, aerial astronomy, use of equipment, quick solution of problems in navigation—in other words, how to get there safely! This book thoroughly qualifies you to navigate aircraft under all conditions. Postpaid $4.50.



Author: *Instructor in Aerial Navigation, U. S. Navy*

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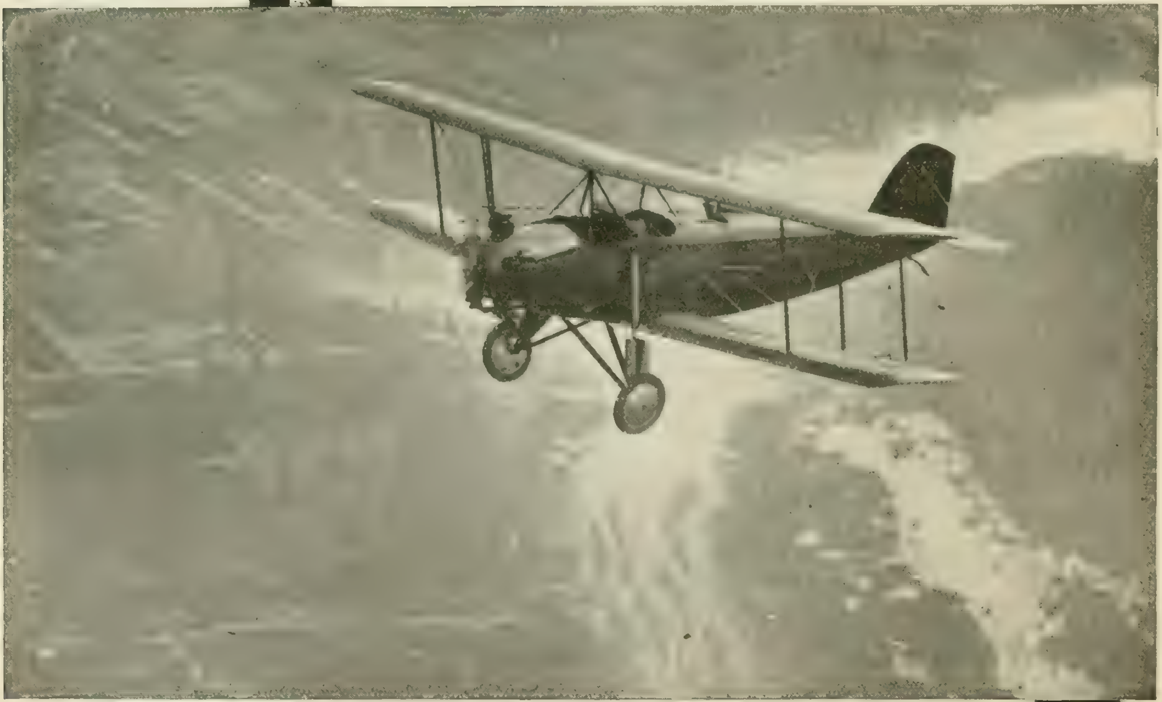
Some experienced pilots have taken the Kittyhawk into the air . . . tried to spin it . . . and failed. Others have succeeded . . . but even they have been unable to hold the Kittyhawk in a spin for more than half a dozen turns.

With a landing speed of 38 miles per hour . . . with a wheel tread of seven feet two inches . . . the Kittyhawk is particularly adept at getting in and out of small rough fields . . . in fact the Kittyhawk has all the safe flying characteristics which makes it a very desirable plane for the student and inexperienced pilot . . . and yet the expert will find that it will out-perform most every plane in its class.

Write to us . . . we shall be glad to send you further information about the Kittyhawk.

COMPANION TO THE VIKING FLYING BOAT

THE VIKING FLYING BOAT COMPANY
89 Shelton Avenue, New Haven, Connecticut
Miami Hangar — Municipal Airport, Causeway Island



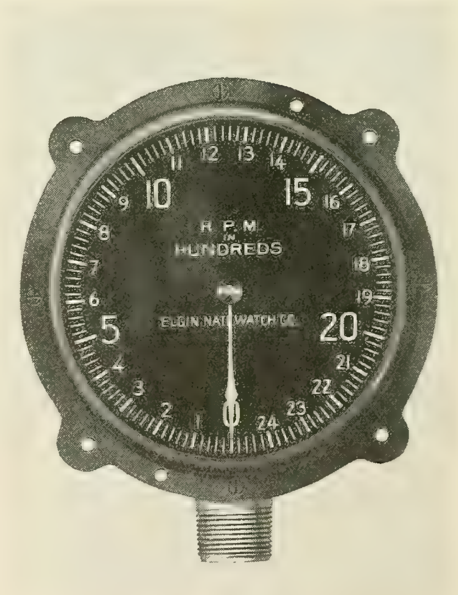
SPECIFICATIONS:

Kittyhawk Model B-4

Engine — Kinner K-5	100 H. P.	Weight empty	1107 lbs.
Approved Type Certificate No 106		Useful load	768 lbs.
Length overall	22 ft 11 in.	High speed	110 m. p. h.
Height overall	8 ft. 8 in.	Cruising speed	90 m. p. h.
Span both wings	28 ft.	Landing speed	38 m. p. h.
Chord both wings	4 ft 6 in.	Climb	1200 ft. p. m.
Wing area	233.4 sq. ft.		

OUT of GAS

"Now where to land"



The easiest way to get into a predicament like that is to run your motor faster than its economical R. P. M. When you have an Elgin Chronometric Tachometer upon your instrument board you know your engine speed, accurately, precisely, because the principle of its construction guarantees that it must register with absolute accuracy the R. P. M. delivered to the head. It is inherently correct.

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AVIGO ELGIN

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(VIBRATION PROOF)

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Its development covers two years of over 600 series of vibration tests.

Let us tell you more about it at our booth at the coming International Aircraft Exposition at

ST. LOUIS, FEB. 15 to 23, 1930

Adopted by the Sky Specialties Corporation of Detroit for the Heywood Starter after conclusive tests in favor of the HI-DUTY

THE IMPERIAL BRASS MFG. CO.
Chicago, U.S.A.

A noteworthy change in IRELAND SELLING POLICY

A long-existing arrangement . . . the exclusive sale of IRELAND 5-Place Amphibions by a national sales agency . . . has been terminated by the manufacturers.

From now on we shall award territorial franchises to responsible, well established dealers and underwrite their success with a well devised manufacturing, merchandising, advertising and service program.

If you would like to qualify for one of these lucrative franchises, we shall be glad to hear from you; the sooner the better, as IRELAND franchises are in demand. Communicate direct with us or consult our executives at the St. Louis Exposition.

This fundamental change in selling policy is only the beginning of a series of moves destined to place the IRELAND rapidly in the forefront of amphibions.

One of these is a reduction in price. Another is an intensive cultivation of our known market—and the development of excellent prospects for you. Still another, is a consistent, finely wrought advertising campaign in magazines which appeal to the thousands whose names appear in America's social register. This has already begun . . . it is not contemplated, it is in full swing now!

The progress and success of the IRELAND in 1929, based on a performance that was superlatively fine, insure a measure of profit to the dealer far beyond conservative expectations. Ably managed, soundly financed, served by a splendid staff of technicians, IRELAND possesses all the important fundamentals which make your association with it well worthwhile. IRELAND AIRCRAFT, Inc., Garden City, N. Y.

PERTINENT FACTS ON THE IRELAND

Performance with Full Load Guaranteed within 5%

High Speed	120 M.P.H.
Cruising	105 M.P.H.
Landing	48 M.P.H.
Climb	950 F.P.M.
Take-off from Water	18 Sec.
Range	450 Miles
Ceiling, Service	14,000 Feet

SPECIFICATIONS

Engine—Pratt and Whitney Wasp	425 H. P.
Length Overall	31 Feet
Span Upper Wing	40 Feet
Span Lower Wing	34 Feet
Chord	5 Ft. 6 In.
Propeller	Standard Steel
Capacity	Five Persons
Price—Flyaway at Factory	Being revised downward

Completely equipped with Anchor, Navigation Lights, Electric Starter, etc.

IRELAND

FIVE-PLACE AMPHIBION

SAFE HARNESS

SUPPORTS YOU IN COMFORT—

While you glide gently to earth in an Irvin Air Chute, you are in the same comfortable sitting position you would assume in a swing.

THE harness of an Irvin Air Chute is readily adjusted to fit the largest or smallest person, and is made of a specially woven linen webbing of 3000 pounds tensile strength. It is re-enforced on all metal parts. These metal parts consist of the snaps and adapter buckles used in securing the harness and adjusting it for size. They are chrome nickel steel with a tensile strength well over 5000 pounds, and are either galvanized or cadmium plated.

Careful attention to details creates a strength that follows through to every part of an Irvin Air Chute.

Irvin Air Chutes are available in all sections of the country. Among the important distributors are Curtiss-Wright Flying Service, Colonial Flying Service, Air Associates, Inc., Nicholas-Beasley Airplane Company, Cleveland Institute of Aviation, Cleveland, Ohio; Pittsburgh Aircraft Agency Corporation, Pittsburgh, Pa.; Ludington Philadelphia Flying Service, Philadelphia, Pa.; Motor Equipment Company, Wichita, Kan.; Walter M. Murphy Co., Los Angeles, Cal.; Aero Corporation of California, Los Angeles, Cal.; Southern Equipment Co., San Antonio, Texas; C. T. Stork Corporation, New York, N. Y., and Mid-West Aviation Corp., Omaha, Nebr.

Dealers who are interested should communicate directly with the company. If there are no dealers near you, write to us and we will arrange the most convenient way to supply your needs.

IRVIN *The Life Preserver of the AIR*

IRVING AIR CHUTE CO., INC., 372 PEARL STREET, BUFFALO, N. Y.

Our Motion Picture "Happy Landings" on standard width film, illustrating actual operation of the Irvin Air Chute is available free of charge to schools, clubs and organizations interested in aviation. Send for booklet and particulars.

Cutting Production Costs *for the* Entire Industry

IN the aircraft industry, as in the automobile industry, mass production is the solution to high manufacturing costs. Every aircraft manufacturer who is alert to the present marketing situation also realizes that production costs and subsequent selling prices on present-day aircraft are responsible for the limited potential market for his product. The Aircraft Products Corporation, geared for straight line mass production on standard aircraft parts, are cutting production costs for America's leading aircraft manufacturers. Our manufacturing facilities . . . . our low selling expense—due to a diversity of products—and the volume of our business permits a greater degree of accuracy and finer workmanship at a lower price per unit. You, too, can benefit through the economies of this mass production. Write today . . . . our engineering staff will gladly co-operate with you on problems of design or adaptation. AIRCRAFT PRODUCTS CORPORATION OF AMERICA, Detroit, Michigan. Designers and manufacturers of Airplane Wheels and Brakes, Axles and Complete Undercarriages, Oildraulic Shock Struts, Tail Wheel Assemblies, Airplane Skis, Flying Boat Hulls, Pontoons, Wing Tip Floats, Airplane Parts and Special Fittings.

Aircraft Products
CORPORATION
OF AMERICA

Record Flight Service

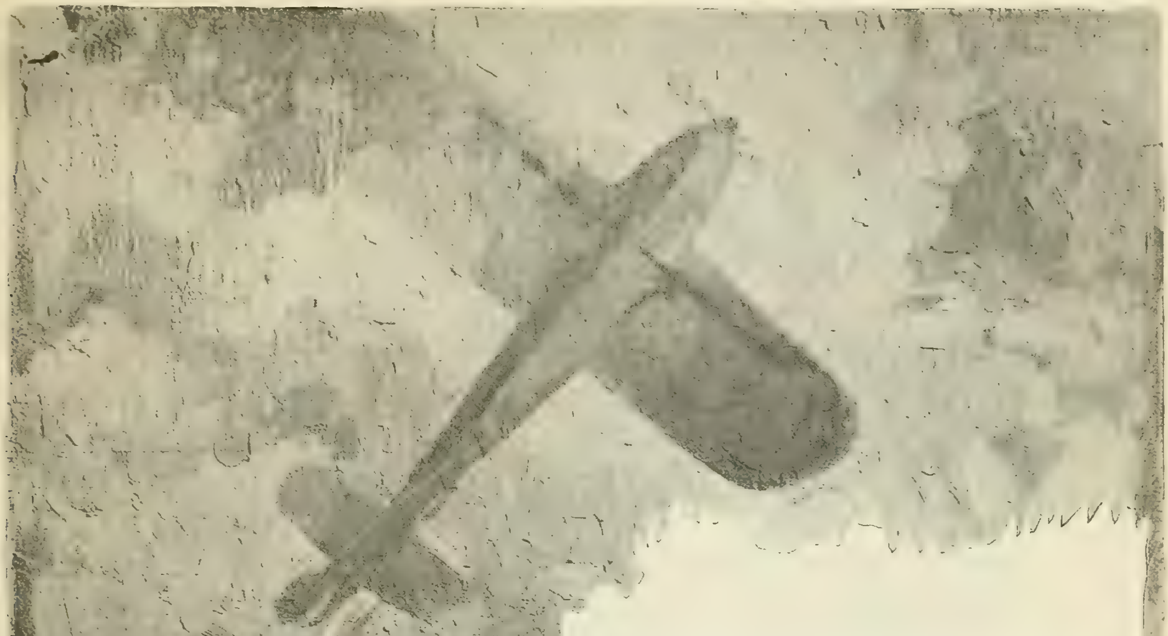
IN every outstanding American aeronautical achievement since 1921, Thompson Valves have contributed importantly to motor efficiency and dependability.

Unusual resistance to burning, battering, warping, pitting and carbon accumulation, have established them as unquestioned leaders in the field. *Today, they are installed as original equipment in 95 per cent of all American-built aero motors.*

THOMPSON PRODUCTS, INCORPORATED
General Offices: Cleveland, Ohio, U. S. A.
Factories: Cleveland and Detroit

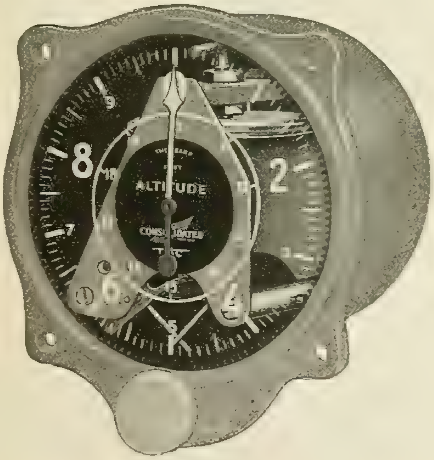
Thompson Valves

TP
TRADE MARK



New

WITH A WEALTH OF NEW MEANINGS



Altimeter built for U. S. Air Services, embodying newest refinements:

- Diaphragms so soldered as to eliminate lag.
- Diaphragms so built as to require no external spring.
- Mechanisms operating without chains and rigid in box-like frame.
- Fewest possible parts, simplest construction.
- The best Altimeter, bar none, offered to commercial aviation.

ALTIMETERS from the brain and hands of the engineers of Aircraft Control Corp., esteemed purveyors of aircraft instruments to the U. S. Air Services.

ALTIMETERS from the laboratories of Friez whose recording Altimeters have been, since the birth of Aviation, the exclusive arbiters of all altitude and endurance flights.

ALTIMETERS whose steady pointers show with highest accuracy and reliability the climbing and descending manoeuvres of the pilot.

ALTIMETERS too, designed especially for landing, so sensitive as to show the rise between floors of a commercial elevator.

ALTIMETERS symbolic of a scientific spirit for whom none but the best can ever be good enough.

Not ALTIMETERS that are only copies of household aneroid barometers with chain driven mechanisms and of flimsy construction obsoleted long ago as instruments of precision for aviation; not, to frame a sentence, prehistoric instruments of a nature entailing every reason for error.

ALTIMETERS, we say with pride, which within a few months will win for Consolidated a prestige in instruments as significant as that of Sterling in silver.

CONSOLIDATED INSTRUMENT CO.
of AMERICA, INC.
Baltimore St. and Central Ave. • Baltimore, Md.

Divisions
Julien P. Friez and Sons, Inc., Baltimore, Md.
Molded Insulation Co. • Mt. Vernon, N. Y.
Aircraft Control Corp. • Philadelphia, Pa.
Factory Branch • • • Wichita, Kansas
Sales, Service, and Repairs • 221 S. Lawrence St,

AIRCRAFT HARDWARE

We are the pioneer and only exclusive manufacturers of aircraft hardware and detail parts in the world.

Aero Supply lists over 3,000 different items and in all the various sizes used by the manufacturer of aircraft.

AERO SUPPLY MFG. CO., INC.

College Point Long Island, N. Y.

SUBSIDIARIES

NATIONAL STEEL PRODUCTS COMPANY
DAYTON, OHIO

STANDARD AUTOMATIC PRODUCTS CORPORATION
CORRY, PENNSYLVANIA

OUR CREED

MAKE IT SAFE FOR THE FLYERS

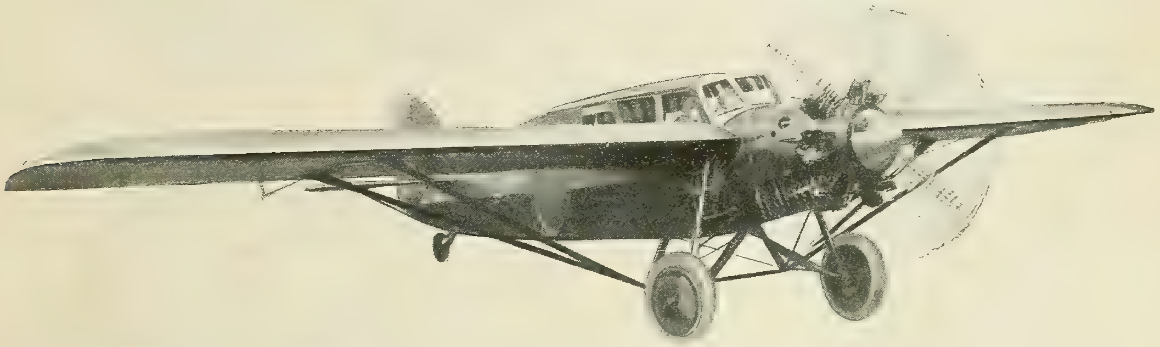
THE WORLD OVER

BUILT TO A-N STANDARDS

▪ *Your Assurance of Quality* ▪

INVINCIBLE

Four Place CENTERWING *Monoplane*



MORE

Than a Fair Weather Sailor

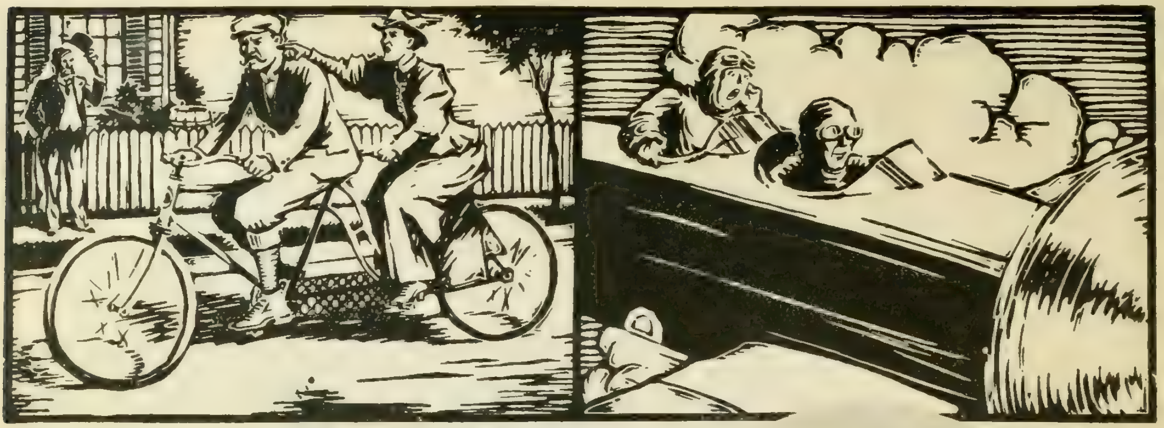
Why wait for a change in the weather—an "Invincible" will get you there! Without a saving in time, business flying loses much of its commercial value. Then *why* be content to wait?

Through storm, rain or wind, your confidence in the Invincible grows on you. She's more than a fair weather sailor. Wings located in perfect alignment with the center of the propeller thrust level off more perfectly in adverse winds. With speed and power beyond its motor rating and stability that simplifies handling, this roughneck of the air has mastered storms few planes could hope to travel.

A pilot, three passengers and baggage travel in luxurious comfort with every modern appointment, at a cruising speed of 120 m.p.h. and 142 m.p.h. at top speed. A 170 H.P. Curtiss Challenger engine is standard equipment. Interested parties can arrange for flying demonstrations by writing for full details. Address the

Aircraft Division

Invincible Metal Furniture Co.
Manitowoc, Wisconsin.



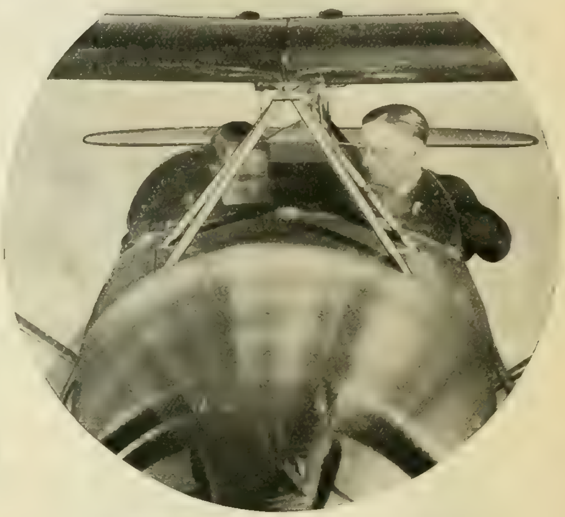
When You Teach Him to Fly—

Sit Side-by-Side

in an

INLAND SPORT MONOPLANE

"TOMORROW'S PLANE TODAY"



This actual photograph shows how easily student and instructor may converse while flying in an Inland Sport.

No airplane is better for training than the high-wing, two-seater Inland Sport Monoplane. Its side-by-side seating arrangement enables instructor and student to talk face-to-face in ordinary tones, even while flying at high speed.

The instructor can point directly to the controls which the student operates . . . can touch them if necessary. There's no need for bothersome head-phones . . . no necessity for pantomine and a complicated code of signals to "keep her nose down" and so on. The instructor simply tells the student what to do . . . and he does it.

If the student makes a mistake, the instructor can correct him instantly. This eliminates waste of time . . . saves coming back down while instructor and student "talk it over" . . . saves the operation of an idling motor during such conferences . . . and best of all, reduces to a minimum the possibility of accident. Seated side-by-side in the same cockpit with the student, the instructor can correct serious blunders before disastrous results occur.

Sturdily built, the Inland has the strength and ruggedness to withstand the hard usage of student training. It will take the bumps like a gentleman . . . absorb shocks without serious injury to its nervous system.

Above all, the Inland is economical to own . . . economical to operate. It enables schools to train students at less cost and in less time per student than normally . . . or else, to train *more* students in the same length of time with your present staff of instructors.

Powered with a LeBlond 60 or Warner Scarab engine, the Inland is a small, low-price sport plane with few equals in refinement of design, beauty of line and color, performance and reliability. May we send you further details?

INLAND SPORT
KANSAS CITY MISSOURI

Manufactured at Fairfax Field under Approved Type Certificate No. 259

USING a stock model Inland Sport, Lt. Willfred G. Moore recently set a new American light-plane record for altitude . . . and later, in the same Inland, set a new world's speed record for light planes over a closed course.

INLAND AVIATION CO.
Fairfax Field, Kansas City, Kansas

THE BERRYLOID FLEET — NUMBER ELEVEN OF A SERIES

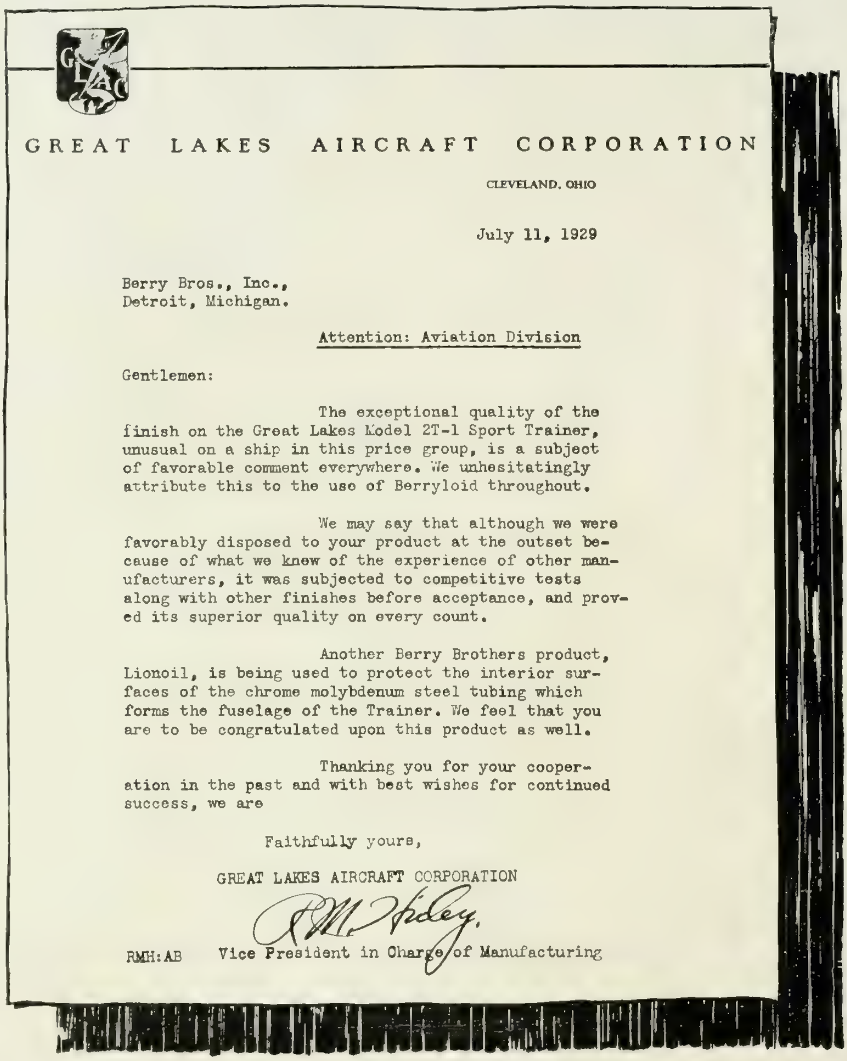
© 1929

GREAT LAKES *and* Berryloid AIRCRAFT FINISHES

The Great Lakes Sport Trainer is beautified and protected throughout with Berryloid Aircraft Finishes. International orange and black, colors of the Cardinal, emphasize the trim lines of the ship illustrated.

MEMBER · AERONAUTICAL · CHAMBER · OF · COMMERCE

GREAT LAKES *attributes* beauty of finish *to* Berryloid



GREAT LAKES AIRCRAFT CORPORATION
CLEVELAND, OHIO

July 11, 1929

Berry Bros., Inc.,
Detroit, Michigan.

Attention: Aviation Division

Gentlemen:

The exceptional quality of the finish on the Great Lakes Model 2T-1 Sport Trainer, unusual on a ship in this price group, is a subject of favorable comment everywhere. We unhesitatingly attribute this to the use of Berryloid throughout.

We may say that although we were favorably disposed to your product at the outset because of what we knew of the experience of other manufacturers, it was subjected to competitive tests along with other finishes before acceptance, and proved its superior quality on every count.

Another Berry Brothers product, Lionoil, is being used to protect the interior surfaces of the chrome molybdenum steel tubing which forms the fuselage of the Trainer. We feel that you are to be congratulated upon this product as well.

Thanking you for your cooperation in the past and with best wishes for continued success, we are

Faithfully yours,

GREAT LAKES AIRCRAFT CORPORATION

RMH:AB Vice President in Charge of Manufacturing

GREAT LAKES
was preceded
in this series
by
STINSON
FOKKER
BUHL
TRAVEL AIR
EAGLEROCK
KEYSTONE
BOEING
COMMAND-AIRE
FAIRCHILD
and
MONO AIRCRAFT

DISTRIBUTORS OF BERRYLOID AIRCRAFT FINISHES:

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Roosevelt Field, Garden City, N. Y.

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Southern Aeromotive Service, Inc.
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Northern Airways, Inc.
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Aeronautical Corp. of Canada, Ltd.
Winnipeg, Canada

MANUFACTURERS · OF · PROGRESSIVE · AIRCRAFT · FINISHES

BERRY BROTHERS
Varnishes Enamels Lacquers
Detroit, Michigan *Walkerville, Ont.*

A LOCKHEED FOR COLONEL LINDBERGH

Last summer Colonel Lindbergh laid before Lockheed engineers specifications for the type of airplane which would meet his ideas and requirements. It should incorporate the latest development in aircraft engineering and design. It should be powered with a proven type of engine and, therefore, obtain efficiency through aerodynamic design, rather than through additional power. It should have a maximum top speed, together with a large carrying capacity, and a landing speed which would permit the use of undeveloped airports far from organized airways.

Colonel Lindbergh recommended a low-winged monoplane with two open cockpits — and the Wasp-powered Sirius is Lockheed's answer.

According to the agreement between Colonel Lindbergh and the Lockheed Corporation, the plane was not to be paid for until its performance was satisfactory. In California last month Colonel Lindbergh took delivery of the first Lockheed Sirius and expressed his approval of the design. As a result of the performance tests of Colonel Lindbergh's plane, the Sirius has been made a standard model in the famous Lockheed line.

DETROIT AIRCRAFT

UNION TRUST BUILDING, DETROIT
ROOSEVELT BLDG., LOS ANGELES :: CHANIN BLDG., NEW YORK

Lockheed Aircraft Corporation
Ryan Aircraft Corporation
Parks Air College, Incorporated
Parks Aircraft Corporation
Eastman Aircraft Corporation
Aircraft Development Corporation
Blackburn Aircraft Corporation
Marine Aircraft Corporation
Grosse Ile Airport, Incorporated
Gliders, Incorporated
Aircraft Parts Company, Incorporated
Detroit Aircraft Export Corporation

FAIRCHILD

exhibits and offers a FULL LINE

A.T.C. 89. FAIRCHILD "71." Seven place transport. With 420 h.p. Wasp engine. Inertia starter, cabin heater, folding wings. Equipped with either wheels, pontoons, or skiis. Landplane top speed 135 m.p.h., climb 675 feet per minute, service ceiling 15,300 feet, cruising range 650 miles. Price landplane, $18,900 flyaway Farmingdale.

A.T.C. 242. FAIRCHILD "42." Custom Foursome, for business executives and sportsmen. Equipped with Wright J-6 300 h.p. engine. Dual controls. Inertia starter. Folding wings, top speed 130 m.p.h., climb 700 feet per minute. Service ceiling 15,300 feet. Price $12,900 flyaway Farmingdale.

Ask at the Arena, St. Louis, or at Sales Headquarters, Chase Hotel, for details of the complete merchandising plan made available exclusively to holders of the valuable Fairchild Dealer Franchise.

AT THE International Aircraft Exposition in St. Louis you will see the complete Fairchild Line, including two to seven place ships, for training, sport, taxi, executive, mail and transport work. Each of these ships has been given a Department of Commerce Approved Type Certificate. *All are now in production*, and purchasers may place orders confident that delivery will be made as agreed. All models are available for demonstration at the airport during the show.

Coincident with the showing of these four types, Fairchild is giving its Dealer Franchise even greater values than those inherent in the ships themselves.

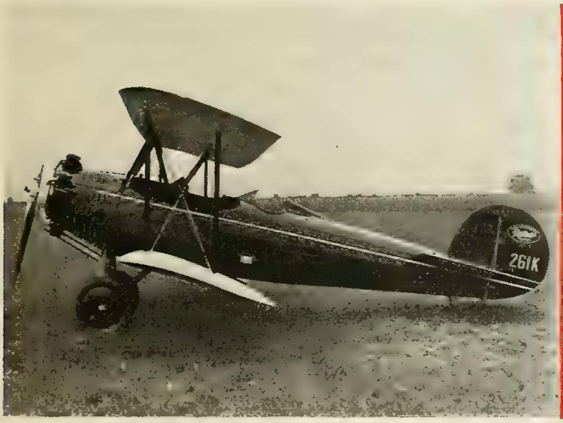
of approved-type ships
NOW IN PRODUCTION

Fairchild believes that a dealer should be not only an aviation enthusiast, but also a business man, seeking and obtaining the prestige and profits that are customary in other lines of business. All of the experience of the Fairchild organization and its associated companies has been combined to assist the dealer in conducting profitable sales and operating activities.

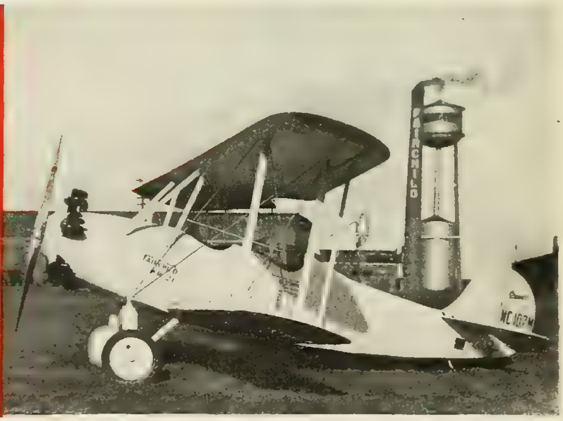
Therefore the holders of the Fairchild Franchise are given specific territory, with full protection therein, covering not only the sale of planes, pontoons and skiis, but also service and associated activities. Assistance will be given business-man-dealer in questions of financing, insurance, accounting, bookkeeping, school operation, club organization and co-operative advertising.

These new values given the Fairchild Franchise promise definitely that the pioneering period in airplane selling is over, and that the trials and losses of the past are being succeeded by the pleasures and profits of sound business. Ask any of the ten Fairchild representatives at the Exposition to reveal the tremendous promise of 1930 and the future. Or write direct to

FAIRCHILD AIRPLANE MANUFACTURING CORPORATION
FARMINGDALE, LONG ISLAND, NEW YORK
Plants: Farmingdale, N. Y.; Hagerstown, Md.; Longueuil, P. Q., Canada.
Division of The Aviation Corporation



A.T.C. 162. FAIRCHILD KR-34. Three place, for training, taxi and sport. With Wright J-6, 165 h.p. engine. Top speed 123 m.p.h., climb 800 ft. per minute. Service ceiling 14,100 feet. Price $6575 flyaway Hagerstown, Md.



A.T.C. 215. FAIRCHILD KR-21. Two place, tapered wings, for training and sport. Equipped with 90 h.p. Kinner engine. Top speed 113 m.p.h., climb 775 feet per minute, loaded. Service ceiling 15,000 feet. An unusually maneuverable ship. Price $4685 flyaway Hagerstown, Md.

FAIRCHILD

AIRPLANES

9 Pilots – 1 Motor Oil

The part Kendall played The Air Derby–

MOTORS—metal moving against metal with lightning speed. Torrid friction endeavoring to tear and blast. Explosive force storming at piston heads and cylinder walls. Intake-compress-fire-exhaust! Straining, driving, roaring force unleashed to the last limit of throttles. What a test for Kendall Oil! What performance! *What a triumph!*

Hour after hour these motors had been driven, reaching control points with mere seconds between their splendid records. Across the steaming everglades—now nosing the sharp air over heights of land—down again through the sweltering heat waves of summer. The finish line—cheers from a sea of upturned faces—an official whipping down his flag—marking each in turn: first, second, third—first, second, third—first, second, third. Three sturdy planes in each of three classes cross that line in the lead—nine planes—winners—victors!

Something clock-like about this—a combined zeal of man, plane and motor that refuses to be beaten. A significant reason must support these pilot's statements

R. E. DAKE
1st place, Class B

"In placing first, I am convinced that Kendall 'J' has again played a very important part in the race."

CHARLES W. MEYERS
2nd place, Class B

"The splendid performance of Kendall Oil and the assistance of your men had a great deal to do with our placing in this derby as well as we did."

C. A. BURROWS
3rd place, Class B

"During this race I used Kendall products exclusively and I am glad to say I experienced no lubrication trouble whatever."

GEORGE E. HALSEY
1st place, Class C

"I won . . with a tight, new motor and the quality oil—Kendall 'J' made it possible for me to win."

Visit the Kendall Exhibit at the International Aircraft Exposition, St. Louis, Feb. 15th to 23rd

BUY AT THIS SIGN
PENZBEST
KENDALL
PENNSYLVANIA OIL
MOTOR OILS
IT IS YOUR PROTECTION

KENDALL

9 Victories ..... Kendall

in a Supreme Test— Miami to Cleveland

that their motors are still good for hours more of strenuous work!

The answer is recorded in nine straightforward letters—a unanimous answer—a tremendous tribute to the abiding dependability of the oil used in every winning motor—KENDALL!

The statements from the nine winning pilots, reproduced on these pages, coincide with hundreds of others throughout the world of aviation. Not only for racing, for gruelling tests, but also for everyday perfection in flying for pleasure, business, travel, training. For Kendall Oil is made from the Bradford Grade of Pennsylvania Crude—a crude that yields its extraordinary lubricating qualities by straight, simple, acidless refining methods. For every test, for every season, insist on Kendall in *your* airplane motor.

For a list of airports where Kendall is now obtainable, for complete information about this remarkable all-Bradford Pennsylvania Lubricating Oil, address: Kendall Refining Company, Bradford, Penna.

J. CARROLL CONE
2nd place, Class C

"Kendall 'J' made it possible for me to race wide open from Miami to Cleveland, winning second place against planes normally much faster than mine."

E. Z. NEWSON
3rd place, Class C

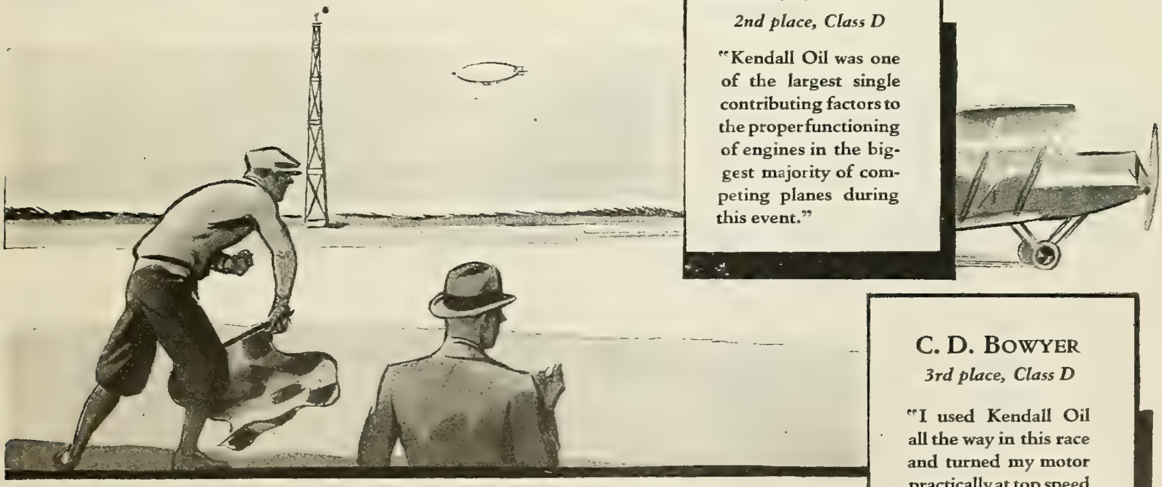
"...Especially tell you of the wonderful service we enjoyed of Kendall Oil. It was a long grind and certainly a real test."

EARL ROWLAND
1st place, Class D

"I am very glad to report I have won the Miami to Cleveland Race for Cabin Ships with Kendall Oil in my motor."

LESLIE H. BOWMAN
2nd place, Class D

"Kendall Oil was one of the largest single contributing factors to the proper functioning of engines in the biggest majority of competing planes during this event."



C. D. BOWYER
3rd place, Class D

"I used Kendall Oil all the way in this race and turned my motor practically at top speed during the entire race without any sign of heating."

OIL

REFINED FROM 100% BRADFORD GRADE OF PENNSYLVANIA CRUDE

ANNOUNCING *The New*

MIKO

Spark Plugs

To provide the widest possible range of selection, AC now offers, in addition to its well known line of porcelain-insulated spark plugs, a complete line of mica-insulated spark plugs, especially designed for aircraft engines.

The new Miko plugs are available in a heat range, with gradations of insulator lengths, to meet the heat characteristics of different engines and different operating conditions.

Into these new Miko plugs have been built these important superiorities:

Laboratory tested mica of highest insulating quality.

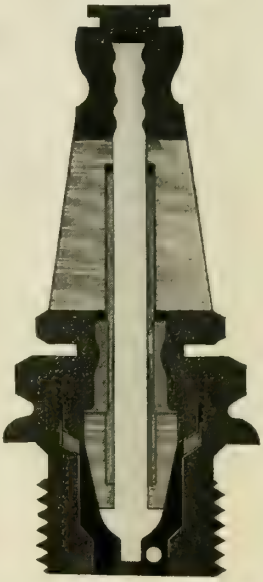
Sealed by electrical process. Absolutely gas tight.

The "Isovolt" electrode, a new development, insures uniform sparking voltage, and requires 50% less voltage than other wire.

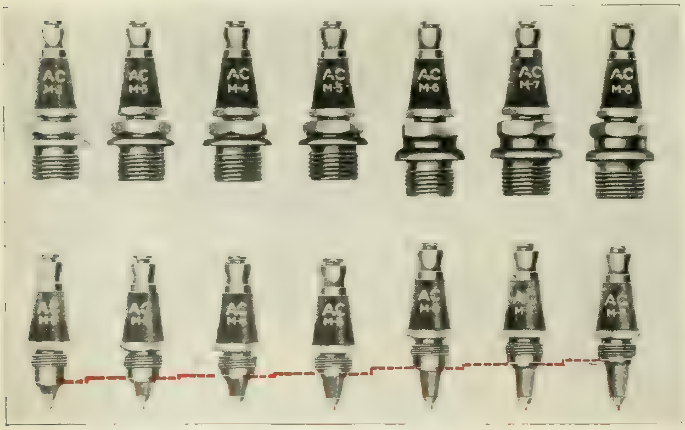
Electrically welded, patented side electrode provides 35 times better electrical and 3 times better heat conductivity.

Terminal and center electrode are fused by electrical process, eliminating danger of terminal becoming loose.

The illustration below shows the seven new AC MIKO Spark Plugs for aircraft engines in order of their heat range.



Cutaway view showing superior construction of AC Miko Spark Plug



The popular line of AC porcelain-insulated aircraft spark plugs are likewise available in a heat range, with gradations of insulator lengths, to meet the heat characteristics of different engines and different operating conditions.

The length of insulation, shown below the dotted line in the illustration to the left, governs the AC heat range. The shorter the insulation exposed to the combustion gases, the cooler the plug; the longer this insulation, the hotter the plug.

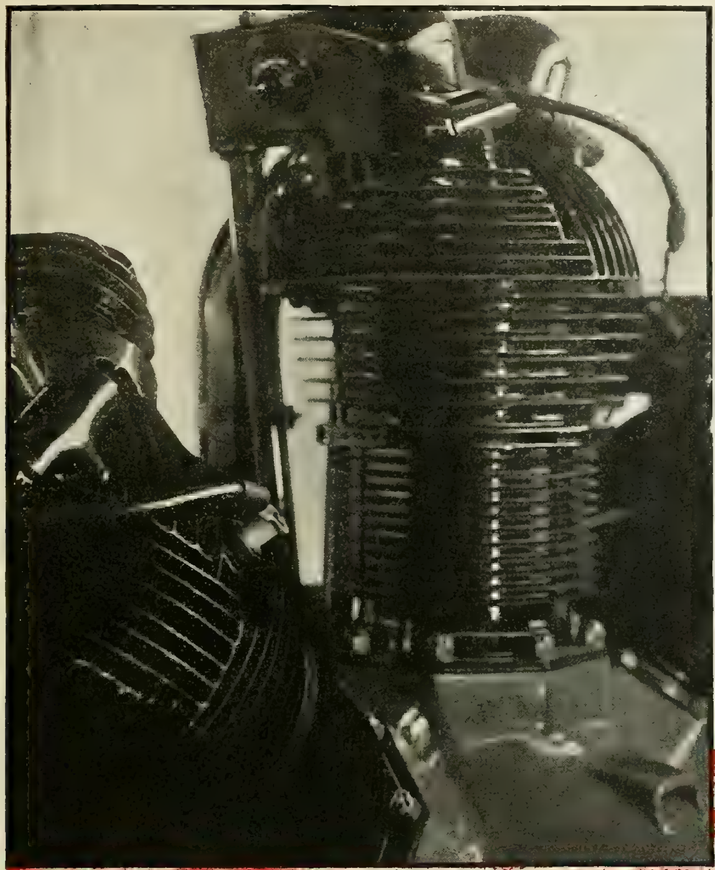
AC-SPHINX
Birmingham
ENGLAND

AC Spark Plug Company
FLINT, *Michigan*

AC-TITAN
Clichy (Seine)
FRANCE

© 1930, AC Spark Plug Co.

AC SPARK PLUGS AC SPEEDOMETERS AC AIR CLEANERS AC OIL FILTERS AC FUEL PUMPS
AC GASOLINE STRAINERS AC AMMETERS AC OIL GAUGES AC THERMO GAUGES AC GASOLINE GAUGES



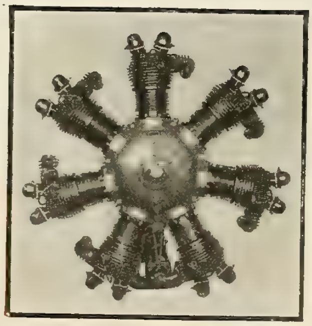
AXELSON *Airplane* ENGINES

NEW COOLING EFFICIENCY

WITH THE

Pompadour Head

A veritable torrent of air sweeps through and around the fins of the Axelson pompadour head. Dead, blind radiation spaces are eliminated. The scientific fashioning of the fins takes away the heat as fast as generated. And the Cylinder heads have a racy, symmetrical appearance in keeping with the vitality of power within. It's the raciest engine ever built for the sport plane. Make your plane manufacturer demonstrate his plane with an Axelson before you place your order. That will prove his plane—and the engine, too. Ask for Catalog.



Axelson Aircraft Engine Co.,
Factory and General Offices,
Corner Randolph St. and Boyle Avenue,
Los Angeles, California.
(P. O. Box 337)

A
THE WINGED POWER

At all the leading airports and aviation fields in the territory in which we operate you will find these-

AMOCO PRODUCTS

AMOCO AERO OIL

*AMOCO-GAS (AVIATION GRADE)

AMOCO-GAS

The Original
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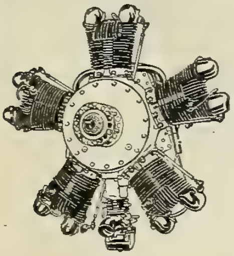

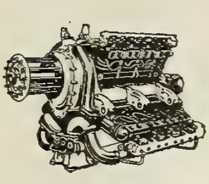

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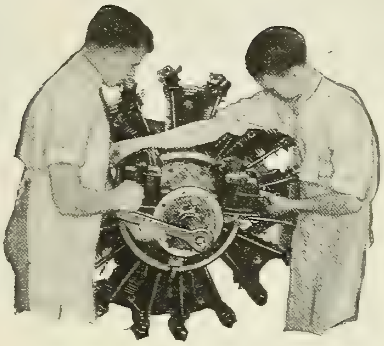

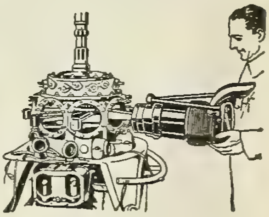

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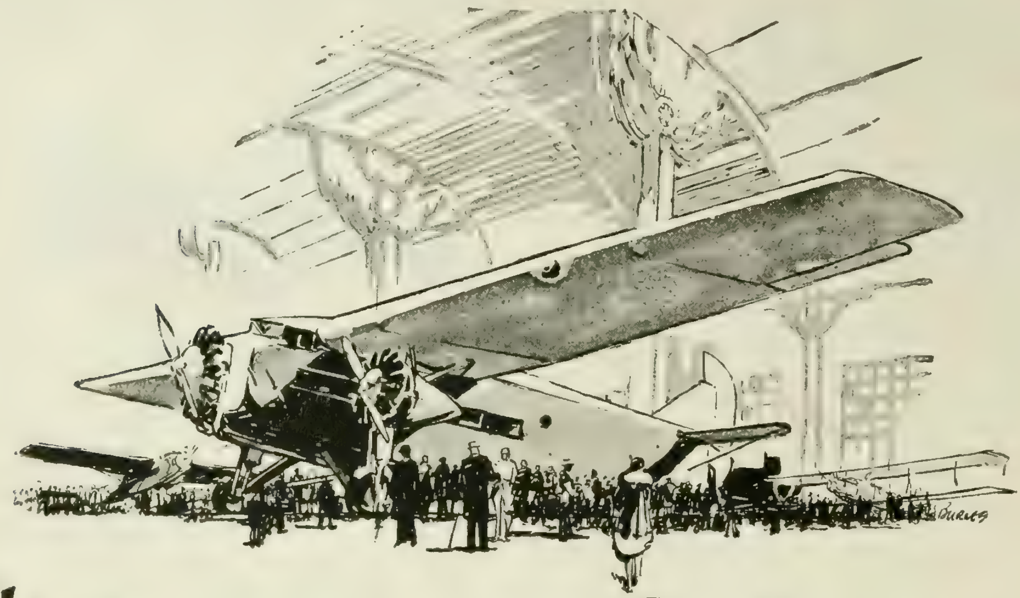

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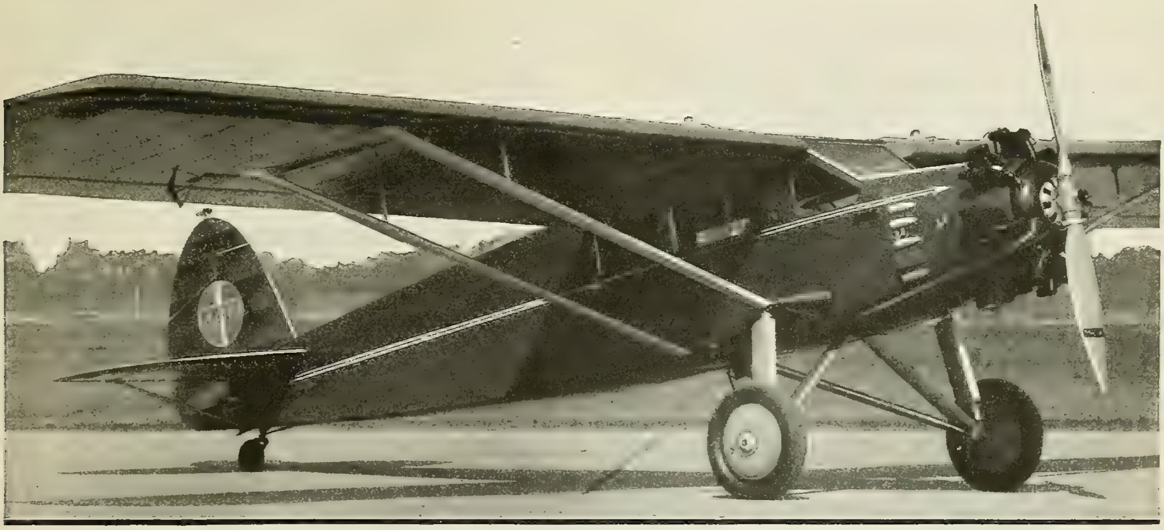

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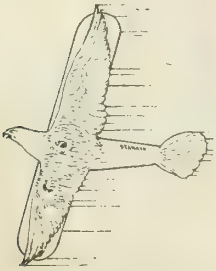

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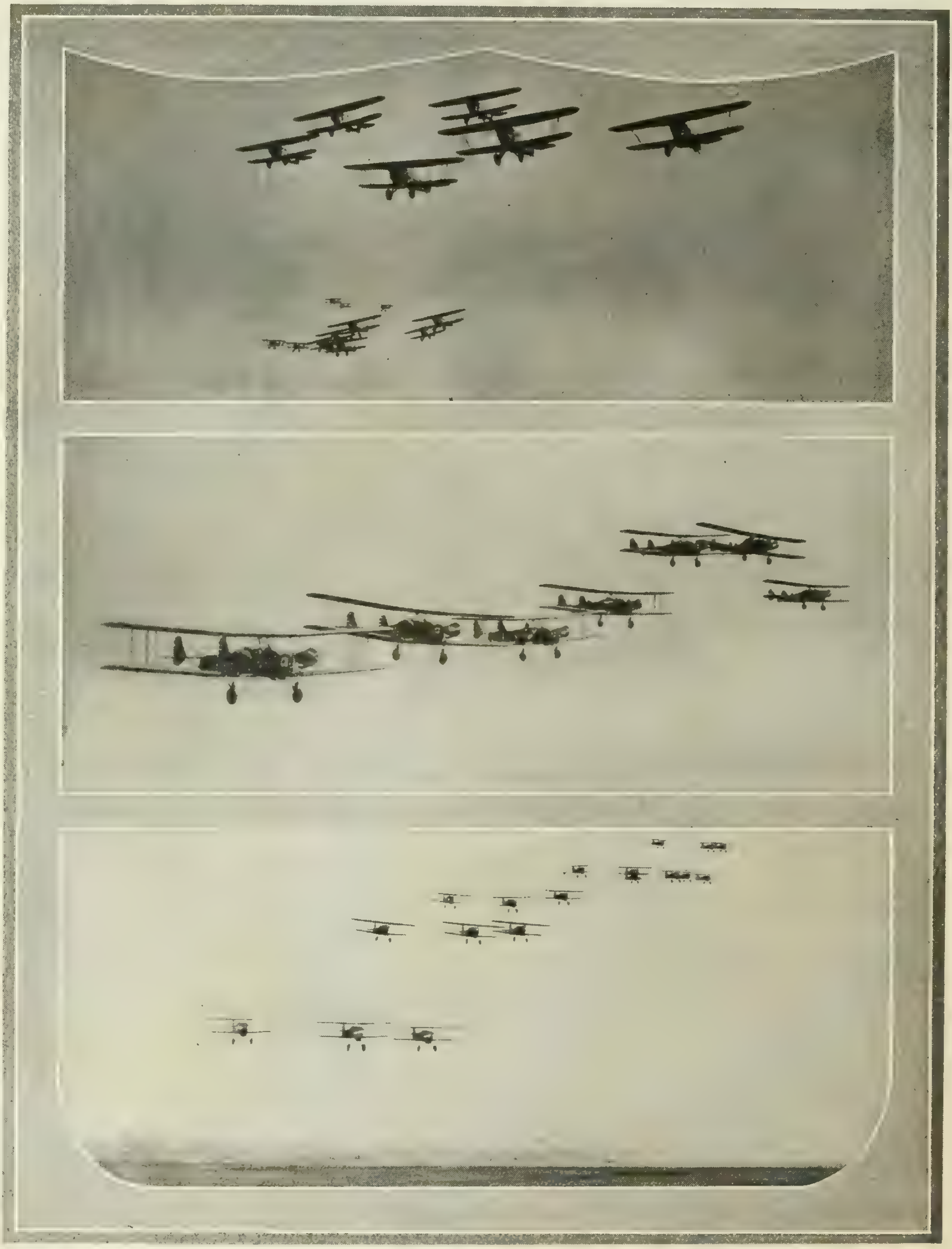


U. S. Army Air Corps Photographs

Army service type airplanes in maneuvers; at the top, a Pursuit Group; below it, a Bombing Formation and an Attack Squadron

THE TRAINING OF AIR CORPS RESERVE OFFICERS

By Major-General James E. Fechet

Chief of the Army Air Corps

DURING the past year there has been manifest a greatly increased interest in Reserve Corps flying training. Many requests have been received for the establishment of additional "Reserve airdromes" throughout the country. Reserve officers have used up the flying hours allotted them and many requests have been received for an increase in hours. The Chief of the Air Corps has allotted every hour of flying possible to the Reserve officer from the funds and allotments available. However, it seems to be apparent that more can be done for the benefit of the Reserve officer than is being done. It also appears that some may believe that the Reserve officer is considered and treated as an undesirable factor in the national defense. Nothing can be further from the truth; every Regular officer knows that in a major emergency that body of Reserves, now formed, as well as in the making, is the backbone of our system on the ground and in the air.

Major-General James E. Fechet.

Certain facts concerning this situation are evident.

All airplanes that the Five-Year Program allows for Reserve Corps training have been allotted. The Five-Year Program makes no specific allowance of service airplanes for this training. This type of airplane is very essential, however, for Reserve officers cannot be taught military flying without it. In view of the increased civilian facilities for ordinary flying and because of the fact that a majority of Air Corps Reserve officers will be engaged in civilian flying, it is important that service type equipment be furnished them.

A new system of classifying Reserve officers according to their flying efficiency was put into effect early in 1928. This system calls for a monthly report showing the physical, flying and professional status of every active Reserve officer. The report also shows the amount and type of flying in which they, as a class, engage each month. These reports disclose that, although there are 5,954 Reserve officers in the Air Corps, only about 1,500 of them are qualified for flying service. Some 600 of these 1,500 are qualified for immediate service in a tactical squadron and are classified as Group I pilots. The remainder require refresher training before they could be used in tactical units for combat service. The latter are classified as Group II pilots. When it is considered that approximately 4,000 Group I Reserves are required on mobilization day, it is apparent that the Air Corps is far below the strength necessary to make it effective from a national defense standpoint. Every effort should be made to build up the Air Corps Reserve organization.

As soon as possible after the compilation of data covering Reserve Corps activities during the fiscal year 1929, plans were laid for a more efficient Reserve force. It was felt that the elimination of a certain amount of "deadwood" and the classification of Reserves according to their flying ability was an initial step in this direction. The classification gave us the answer to the basic question, "How many Reserve officers can we put into the field tomorrow, how many after a two or three-month refresher course, and how many can we use for duties other than flying?"

In planning to use this newly classified Reserve Corps to the best possible advantage, we made a comprehensive study of the entire Reserve situation, which was attacked from several angles.

It is not enough to say that we need more funds for Reserve flying. Funds for any purpose are not limitless. In order to function with any degree of efficiency, it is always necessary for us to determine the relative importance of every activity in the Air Corps scheme.

In our study of the Reserve Corps situation we analyzed the accompanying chart of Reserve Corps flying time to see what we, or rather they, the Reserve officers, had done in the utilization of the flying facilities placed at their disposal from July 1, 1928, to June 30, 1929. (See chart on next page.)

During the summer of 1928, soon after the new system of classification had gone into effect and during the active duty period at most stations, those in direct charge of Reserve Corps training at "Reserve airdromes" and at Regular Army units charged with Reserve Corps training, were required to classify those Reserve officers who reported for their two-week tours of active duty training. In practically every case the Regular Army instructors at the "Reserve airdromes" were experienced pilots, officers of sound judgment, and good common sense. These are the qualifications we insist upon for those we assign to such duty. Like qualifications are required in the case of squadron commanders and their operation officers at the Regular Army organizations, since they are in direct charge of Reserve officers undergoing flying training.

Every effort compatible with safety was made to classify our Reserve officers fairly. Many of them did not have the opportunity of reporting during the summer of 1928 for active duty training, but reported instead for "inactive" flying after the summer training season was over. Others were too much on the border-line between Group I and Group II, and their final classification was deferred to a later date when they would have a better opportunity of showing what they could do in, and with, an airplane.

By the end of the fiscal year, practically all had been classified, and of the 1,500 qualified for flying duty, only 600 were placed in Group I.

There would have been less than this number in Group I had I been content to remain passive over the operation of the classification system. The following quotation of a recommendation made by me on April 23, 1929, to the Adjutant General will indicate the attitude taken by the Air Corps towards its flying Reserve officers:

CORPS AREAS	GROUPS	ACTIVE DUTY				INACTIVE DUTY				TOTALS		
		PILOT		OBSERVER		PILOT		OBSERVER				
		SERVICE AIRPLANE	TRAINING AIRPLANE	SERVICE AIRPLANE	TRAINING AIRPLANE	SERVICE AIRPLANE	TRAINING AIRPLANE	SERVICE AIRPLANE	TRAINING AIRPLANE	SERVICE AIRPLANE	TRAINING AIRPLANE	TOTAL
I	Group I	57:40	194:12	9:25	45:10	4:10	529:15	—	47:00	71:15	815:37	886:52
	Group II	3:25	120:20	26:40	132:21	11:00	132:40	2:35	57:38	43:40	442:59	486:39
	Total	61:05	314:32	36:05	177:31	15:10	661:55	2:35	104:38	114:55	1258:36	1373:31
II	Group I	67:30	71:20	15:20	13:15	52:10	104:10	—	—	135:00	188:45	323:45
	Group II	51:35	225:30	7:30	16:55	14:15	380:20	—	25:55	73:20	648:40	722:00
	Total	119:05	296:50	22:50	30:10	66:25	484:30	—	25:55	208:20	837:25	1045:45
III	Group I	27:40	—	—	—	62:49	134:20	—	—	90:29	134:20	224:49
	Group II	649:35	469:50	89:30	71:10	42:00	574:15	1:05	17:40	782:10	1132:55	1915:05
	Total	677:15	469:50	89:30	71:10	104:49	708:35	1:05	17:40	872:39	1267:15	2139:54
IV	Group I	611:30	242:53	59:50	2:35	22:45	23:35	—	—	694:05	269:03	963:08
	Group II	182:35	143:30	35:50	5:30	—	40:25	—	—	218:25	189:25	407:50
	Total	794:05	386:23	95:40	8:05	22:45	64:00	—	—	912:30	458:28	1370:58
V	Group I	28:00	55:35	—	—	204:50	335:55	—	—	232:50	391:30	624:20
	Group II	161:10	73:05	—	—	248:45	867:40	—	12:10	409:55	952:55	1362:50
	Total	189:10	128:40	—	—	453:35	1203:35	—	12:10	642:45	1344:25	1987:10
VI	Group I	2118:45	236:16	89:05	4:35	50:35	192:55	2:55	1:05	2261:20	434:51	2696:11
	Group II	7:45	855:13	31:10	127:50	134:30	382:12	12:25	41:30	185:50	1406:45	1592:35
	Total	2126:30	1091:29	120:15	132:25	185:05	575:07	15:20	42:35	2447:10	1841:36	4288:46
VII	Group I	—	70:55	—	18:00	—	276:05	—	10:35	—	375:35	375:35
	Group II	10:25	462:40	—	66:55	—	508:40	—	26:45	10:25	1065:00	1075:25
	Total	10:25	533:35	—	84:55	—	784:45	—	37:20	10:25	1440:35	1451:00
VIII	Group I	128:30	144:45	27:20	0:10	66:00	200:10	—	12:30	221:50	357:35	579:25
	Group II	108:05	319:45	99:20	21:20	325:50	515:20	3:15	7:30	536:30	863:55	1400:25
	Total	236:35	464:30	126:40	21:30	391:50	715:30	3:15	20:00	758:20	1221:30	1979:50
IX	Group I	707:26	1882:00	17:15	51:25	56:10	1827:27	—	38:05	780:51	3798:57	4579:48
	Group II	13:25	20:20	—	20:00	50:00	813:43	1:10	19:50	64:35	873:53	938:28
	Total	720:51	1902:20	17:15	71:25	106:10	2641:10	1:10	57:55	845:26	4672:50	5518:16
HAWAII	Group I	—	—	—	11:50	—	—	—	—	—	11:50	11:50
	Group II	8:50	—	4:00	—	7:50	9:20	—	—	20:40	9:20	30:00
	Total	8:50	—	4:00	11:50	7:50	9:20	—	—	20:40	21:10	41:50
PANAMA	Group I	—	—	7:10	—	—	—	—	1:40	7:10	1:40	8:50
	Group II	—	—	20:55	4:25	76:15	—	—	—	97:10	4:25	101:35
	Total	—	—	28:05	4:25	76:15	—	—	1:40	104:20	6:05	110:25
TOTAL	Group I	3746:31	2897:56	225:25	147:00	519:29	3623:52	—	110:55	4494:50	6779:43	11274:23
	Group II	1196:50	2690:13	314:55	466:26	910:25	4224:35	23:25	208:58	2442:40	7590:12	10033:02
GRAND TOTAL		4943:51	5588:09	540:20	613:26	1429:54	7848:27	23:25	319:53	6937:30	14369:55	21307:25

Chart of flying time of Air Corps Reserve officers for the period from July 1, 1928, to June 30, 1929.

"Request that the Commanding Generals of the ——— (naming four) Corps Areas be advised substantially as follows:

"Your report of the number of Group I Reserve officers . . . . is far below the average number reported by other Corps Areas. It is requested that a recheck of the classification of Air Corps Reserves be made with a view to increasing the number of Group I . . . ."

Attention is invited to the final sentence in the above quotation. Could anything be plainer as an indication of our attitude toward our Reserve Corps officers?

Beginning July 1, 1929, only those Reserve fliers carried on our rolls as Group I pilots were to receive flying training, for, quoting this time from the Military Appropriations Act for the fiscal year 1930, we find that "no part of such total sum shall be available for any expense incident to giving flight training to any officer of the Officers' Reserve Corps who shall be found . . . . not qualified to perform combat service as an aviation pilot."

What had been done by our field forces to classify these 1,500 fliers is shown in the above Time Chart.

Considering the pilots, we find that 1,196 hours and fifty minutes were devoted to flying by Group II officers on active duty, in service type planes. Many of these Group II pilots who did this flying in service type planes are now in Group I. Some of them are still in Group II and these officers are no longer flying service type planes. The Congressional action quoted above prohibits it. That those Regular Army officers charged with Reserve Corps flying previous to this action were not discouraged at the results of the summer training work, may be seen in another item; namely, the results accomplished by Group II pilots on inactive status flying service type planes. This flying time amounts to 910 hours and twenty-five minutes, and compared with the 519 hours flown by Group I pilots in the same type of planes, it certainly indicates that a continual effort was made to qualify the most promising Group II pilots on the larger planes before finally placing them in a Group II classification if this were found necessary.

It is a fact that among those Reserve officers now in Group II, are pilots who are at present engaged in commercial aviation. In this line many are undoubtedly first class pilots. But flying, let us say, as an instructor in a primary training type of plane at a commercial flying field is far different than flying a highly powered, heavily loaded observation plane weighing two tons, a plane with a top speed of fifty miles an hour more than the average primary training plane. It might be well to mention here that at the Air Corps flying schools many students who have shown considerable skill with the primary type of plane, fail completely when they come to the transition stage to service type planes. The added speed, the added weight of this type, prove insurmountable barriers. Undoubtedly some of these students in time would prove excellent pilots of service type planes. Undoubtedly some of these Group II pilots of the Air Corps Reserve would also prove excellent pilots of service type planes—if given enough time in them. But would it be fair to those Reserve officers who show the normal amount of aptitude thus to deprive them of these planes for the benefit of their brothers who do not show the normal amount of progress?

The licensing officials of the Aeronautics Branch, Department of Commerce, recognize the difference between a qualified pilot of small planes and one of larger, heavier planes, when they rate commercial transport pilots.

No doubt there have been many cases in which Reserve officers have shown poor progress on service type planes but finally qualified as pilots of these planes, and been placed in Group I. Is it reasonable to believe that they will be able to "keep their hand in" on these planes after their tour of active duty during which they were so rated? Few Reserve officers have the opportunity of making more than one visit a week to the Army flying field from which they fly on inactive status, on week-ends or when they can spare time from their daily toil. It takes more than four hours a month of practice flying for a poor or indifferent pilot to retain his piloting skill on our service type planes. It should not be forgotten that a Group I pilot is one who can take his place in a tactical squadron without a refresher course on instruction, and be able

(*Continued on page* 264)

THE WINGS OF SOUTH AMERICA

By John K. Montgomery

President of American International Airways
Vice President, New York, Rio and Buenos Aires Line

THE wing structure around which is fashioned the aviation development of South America is so amazing that one must go down to the ozone and terra firma of our neighboring continent really to appreciate it. If you consider, however, that there are nine transport lines down there operating over 32,000 miles on scheduled routes and that 315,400 miles are flown each month, you will understand to some degree the magnitude aviation is assuming in that part of the world.

John K. Montgomery

The American International Airways, Inc., was formed by a group of men firmly convinced of the great possibilities of South America, to participate and aid in the development of air transportation in a field where we believed it would be of inestimable value. We had acquired a substantial stock interest in the New York, Rio and Buenos Aires Line, which intended to establish an air system in South America connecting with the United States via the heavily populated east coast. It was decided last April to make a survey flight and ascertain first hand what had already been done in air transportation in South America, and what new fields could be profitably developed.

We therefore purchased the giant Sikorsky landplane which had been built for a transatlantic flight and was already equipped for long-distance flying. The plane was flown to Tampa, Florida, where a series of load tests were completed, and on June 30th, 1929, it took off with a crew of six for its South American tour. Those who comprised the crew are Harold McMahon, chief pilot; H. S. Huntington, navigator; H. T. Hunter, radio operator; Luis Medina, mechanic; Ben Sherman, mechanic, and myself as commander and co-pilot.

The first stop was Tela, Honduras, where we landed twelve hours later, after having covered 1,100 miles. The next day we jumped to Puerto Cabezas, Nicaragua, and the following morning flew down to Panama. Five days were spent there in conferences and investigations, and the morning of July 7th we left for Talara, Peru, 1,000 miles distant. This was the worst section of the whole trip, for shortly after leaving Balboa and heading out over the Pacific Ocean, we ran into heavy rain, followed by fog which necessitated our flying blind for five hours before we hit the Colombian coast at Tumaco. Two hours of good weather, then heavy clouds forced us to go to 5,000 feet to get on top, after which for four hours more we flew over a vast expanse of white clouds stretching as far as could be seen in every direction. In the late afternoon, we found a hole—went down through it, and found ourselves along the coast at Cape Blanco, Peru. A few minutes later we landed at Talara. We had been in the air eleven hours and twenty-five minutes. Our radio was a great assistance and comfort on this stretch, for Hunter, the radio operator, through his contact with ships along the route, enabled us to dodge several bad electrical storms.

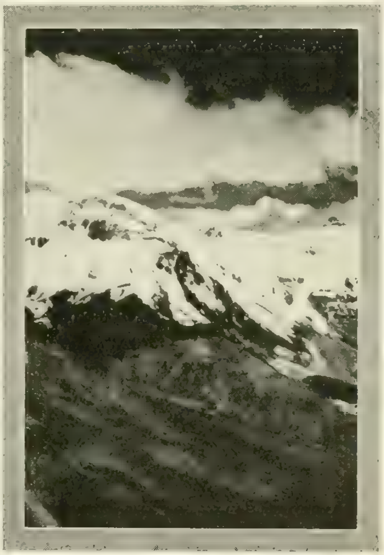
The following day we flew down to Lima. One day was spent there, where I found my old friend Captain H. B. Grow, formerly of the United States Navy, as Director General of Aviation in Peru, and another old friend, Harold Harris, who is vice president in charge of operations of the Pan American-Grace Airways. Both of these men are doing splendid work. Captain Grow, after personal surveys, established the route from Lima over the Andes to Iquitos from the head waters of the Amazon. This route, in two days, connects widely separated Peruvian territories between which the previous transportation time was six weeks.

At Las Palmas, eight miles distant from Lima, is located the Peruvian government field, which is also used by the Pan American-Grace Airways. This is an excellent airport, equipped with hangars, repair facilities and radio. Our first contact with Las Palmas by radio was rather circuitous. Just after taking off and while en route from Talara, Hunter got in touch with an American steamship, which in turn relayed the message to a Peruvian submarine, which sent it to Callao, at which place contact was established with Las Palmas and our expected time of arrival was given.

We left Lima at eleven o'clock on July 10th, expecting

Photo courtesy of Lieut. G. R. Johnson

An aerial view of Las Palmas, the government airport at Lima, Peru, on the west coast of South America to make Arica, but bad weather, including thick fog and head winds, compelled us to land just at dark on the field at Ilo, Peru. An early start was made the following morning, with the usual fog giving us a ceiling of 100 feet and a visibility of but half a mile. For the next four hours this condition continued. Because we had maps of the coast line only, we had to use them by flying underneath the fog. It was a peculiar experience to be flying along close by the massive cliffs which are continuous along this coast for 1,500 miles, rising straight out of the water and disappearing into the fog. Our hats were certainly off to the intrepid pilots of the Pan American-Grace Airways, Scadta, Faucett Aviation and the Chilean National Line, who, for more than 4,000 miles along this coast, maintain regular schedules through terrible weather conditions and over country so rugged that our Alleghenies by comparison seem like a lawn.

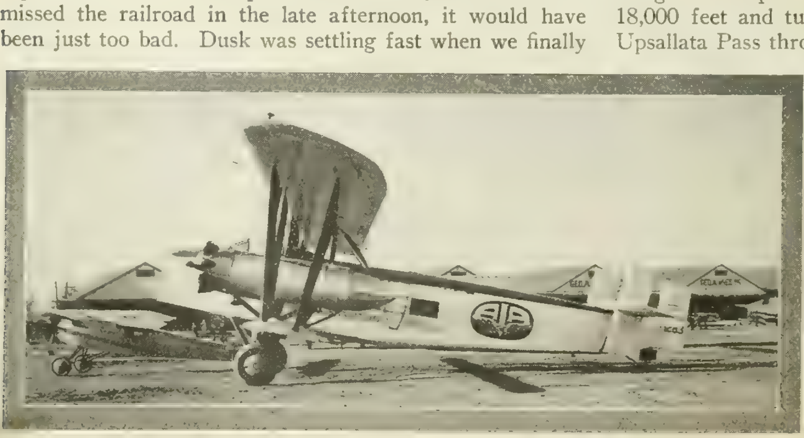

Courtesy of Lieut. G. R. Johnson

Over the Andes at 18,000 feet

At twelve o'clock, we made our first landing on Chilean soil, on the military field at Antofagasta, and had our first sight of the splendid aviation organization which Chile has built up. The officials in charge extended us every courtesy, while we had some lunch and filled the tanks of the plane with fuel. We then took off again and flew on down to Copiapo that afternoon.

NYRBA Ford trimotor flying from Santiago to Buenos Aires

We expected to make an early start from Copiapo the next morning for the final jump to Santiago, but upon arriving at the field at six thirty found it blanketed with fog right down to the ground, and there we sat and champed at the bit until eleven o'clock, when the fog finally lifted enough to make a take-off possible. We went out to the coast and flew under the fog again from there to a point sixty miles above Santiago. We had the prevailing south wind against us all the way and consequently made very slow time. After the fog cleared up at two o'clock, we tried all altitudes from ten feet off the water to 10,000, but always had the same head wind. We left the coast at Port Papudo and at 12,000 feet headed across the mountains for Santiago. The shadows were beginning to settle in the valleys, and we had a few anxious moments until we found the longitudinal railroad which we knew led to the Chilean capital. We had no maps of the interior, and if we had missed the railroad in the late afternoon, it would have been just too bad. Dusk was settling fast when we finally sighted the lights of a city ahead, and a few moments afterwards, the big beacon on the landing field at El Bosque, six miles out of the city. It was certainly a welcome sight, and we lost no time in getting there and landing as quickly as possible. There was a great crowd out to meet us, including the Hon. W. S. Culbertson, American ambassador in Chile, and his staff, government officials, and last but certainly not least one whom we appreciated most of all, Senora Davila, wife of the Chilean ambassador in Washington. In Washington in April, she had christened the ship the *Southern Star,* and we greatly appreciated her coming out to meet us on our arrival at Santiago. Five minutes after we landed it was black night. Incidentally, in the depths of our ignorance, we had failed to realize that in going to the far South, we were exchanging mid-summer for mid-winter, and consequently we were very poorly equipped for cold weather flying. After a pleasant ten days in Chile spent in studying the aviation situation, we left on July 24th to cross the Andes en route to Buenos Aires.


The Sikorsky "Southern Star" at Roosevelt Field before its flight to South America

The *Southern Star* was the first transport plane that had ever attempted a crossing of the Andes, and after hearing the stories in Chile of the terriffic air currents at the high altitudes at which it is necessary to fly in order to cross, we were expecting almost anything to happen. We had on board our regular crew of six and two passengers who were willing to try anything once. Imagine our pleasant surprise, when, after climbing to 18,000 feet and turning toward the mountains across the Upsallata Pass through which runs the Trans-Andean railroad, we crossed this majestic mountain range in the most beautiful weather possible and without hitting anything more than ordinary bumps. The Andes from the air beggar description. While we were in the middle of the range at 19,000 feet, we could still look at Mt. Anconcagua, a few miles to the north, towering above us at 23,000 feet, and a little to the south, Mt. Tunpungarto at 21,500.

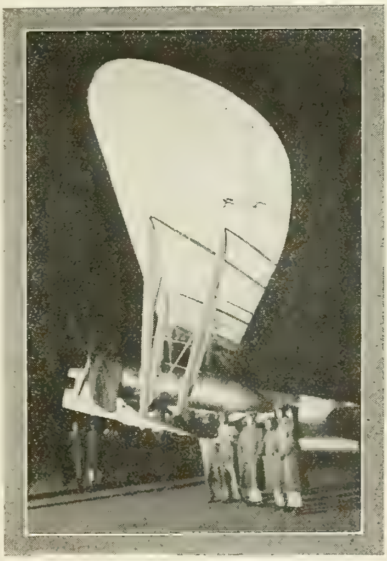
Three hours after leaving Santiago, we landed on the Argentine side of the field at Mendoza, and there spent the night, feeling none the worse for our crossing except from the bitter

Osorna volcano and Lake Llanguihue in Southern Chile

cold we had suffered at the high altitudes.

The following day, we crossed the 600-mile stretch of the vast Argentine pampas to Buenos Aires, arriving there at two o'clock and completing the first flight from New York via the west coast to the Argentine capital, a distance of 6,500 miles. We returned to Chile a week later on a non-stop flight from Buenos Aires to Santiago,, carrying nine people. By that flight we demonstrated the definite possibility of the passenger line over the Andes.

The next four and a half months I spent in Chile, Argentina, Bolivia, Uruguay and Brazil. A trip was made in one of the Ford trimotor planes of the New York, Rio and Buenos Aires Line from Santiago to Arica, and thence up to La Paz, Bolivia. In leaving South America, I flew from Buenos Aires up to Pernambuco, Brazil, 2,700 miles, in one of the Sikorsky amphibions of the NYRBA Line, and four additional round trips were made across the Andes.



The "Southern Star" at Santiago

IN South America is the first successful air transport line in the world, and by "successful" I mean one which has operated for nine years over difficult terrain, has never had a fatality on its scheduled routes, and has a record of eight successive years of dividend payments to its stockholders. I refer to the Scadta line Colombia; this was started in 1921 by Doctor Peter Paul von Bauer, an enterprising Austrian, who, coming to Colombia after the war, saw the possibility of a route from Barranquilla at the mouth of the Magdalena River up to Girardot, just below Bogota. The steamer time under the most favorable conditions is twelve days, and the planes of the Scadta company cover this distance in eight hours.

Efficient operation has established full confidence in the minds of the public, and a conservative expansion program has been carried on, until today the original line reaches from Barranquilla to the Canal Zone, and down the west coast to Guayaquil. From an initial operation of 650 miles, flying 2,600 miles weekly, that line has grown to a system of 3,000 miles, flying 18,000 miles a week.

A year afterward, Elmer Faucett started taxi operations in Peru with an old Curtiss Oriole plane, and now the Faucett Aviation Corporation is operating 1,200 miles of airlines in Peru, and flying 4,800 miles weekly.

From these humble beginnings has grown the present great network of airlines, which extend along both coasts, through a considerable portion of the interior, and afford connections with the coasts of South America to the United States, Europe and Africa.

No region of the world is more suited for aviation than South America. That continent is one of enormous distances—6,000 miles long and 3,500 miles across at the widest point. Running the entire length of the continent on the west coast is the great Andean range of mountains from 16,000 to 23,000 feet high, and on the east coast there are three great river systems abounding with hundreds of miles of impassable jungles.

The cost of railroad building is prohibitive in many localities, because of the topography of the country, with the result that in the whole continent there is only one transcontinental railroad line. Distances between the various capitals and the principal centers of population are great, and in only a few instances can one be reached from another without the use of boats. The saving of time made possible by air routes renders this form of transportation so valuable that passengers can afford to pay the necessary tariffs involved and still make money. For instance, the Trans-Andean railroad fare across the Andes from Santiago to Mendoza is $100, and the trip requires fourteen hours. The flight on the NYRBA Line passenger plane costs $110 and takes one hour and fifteen minutes. The line which Captain Grow has been instrumental in starting from Lima to Iquitos does a job in two days which formerly required six weeks. And on the Lloyd Aero Boliviana routes there are several places where two hours' flying takes the place of a week's journey on mule back. On the inter-continental routes, the French Aeropostale takes the mail from Santiago, Chile, to Paris, France, in eight and one-half days as compared with a previous time of twenty-four days. The Pan American-Grace Airways, on their line down the west coast and the connections through to the United States, have cut nine days from steamer schedules. The complete

One of the Consolidated Commodores used by N. Y., Rio and Buenos Aires Line route of our associated company, New York, Rio and Buenos Aires Line, better known as the NYRBA, which will be opened in February, will bring Buenos Aires within eight days of New York and cut from eleven to fourteen days from present steamer time.

The best proof that the people of this continent are already air-minded is furnished by the heavy traffic which all passenger lines are enjoying. The Buenos Aires-Montevideo section of the NYRBA Line, which opened August 21st and has been operated on a twice daily schedule, has carried more than 2,500 passengers since it began operations and is now carrying in excess of 200 passengers per week. The NYRBA passenger line over the Andes between Santiago and Buenos Aires, which eight months ago was considered impossible, is now doing excellent passenger business, although crossing at altitudes from 18,000 to 20,000 feet. Regularity of service on this line is rapidly convincing that section of

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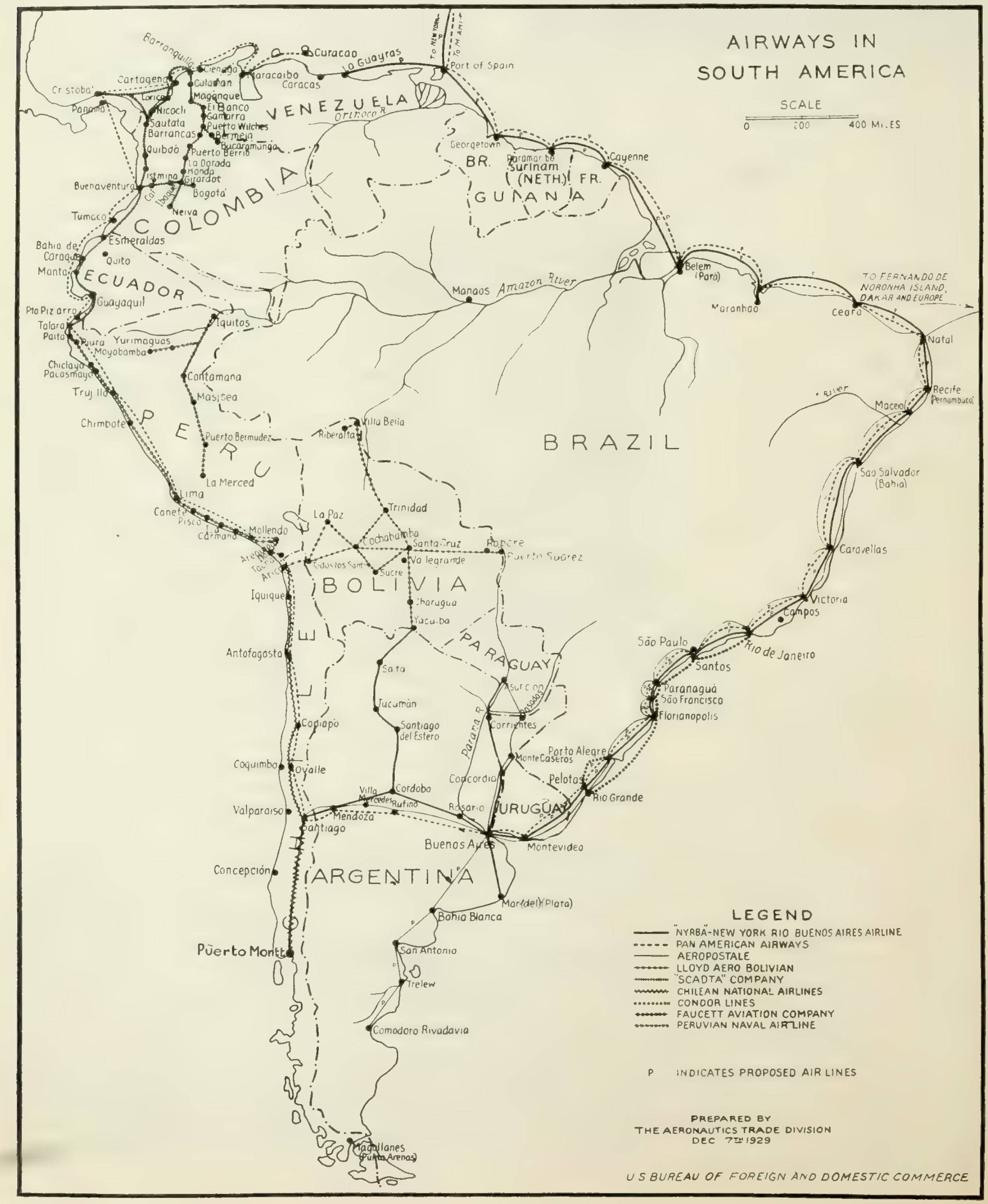


GERMAN COMMERCIAL AVIATION IN 1929

By Dr. Carl Hanns Pollog

THE year 1929 will not be classified as "good" in the annals of German aviation. It was a year of crises and, as the first year of the second decade of commercial aviation in Germany, will be the first to show a decrease in the mileage flown, and perhaps even in passengers, freight and mail carried. It will, however, be remarkable in that the principle of state quasi-monopoly in transport aviation has been effectively broken.

In the winter of 1925-26 German commercial aviation was completely reorganized. Until that time Germany has experienced exactly the same evolution that had characterized post-war flying in the United States: the barnstormer and aerial circus had given way to the small independent companies which later merged and combined. At that time only two large concerns were left, the Deutscher Aero Lloyd and the Junkers group, which were in keen competition, often over the same routes. Both of the groups were heavily subsidized by the central government, the state governments, and the towns and cities which were served by their routes. Eventually it proved impossible to maintain by subsidy two services and two ground organizations, where one would have sufficed. Therefore, by pressure of the Ministry of Communications, the Deutscher Aero Lloyd and the Junkers Luftverkerhr were merged into the Deutsche Luft Hansa, which alone was to be entitled to receive subsidies from the central government.

Otto Merkl, director of the Luft Hansa

This policy had its sound effects on the long-distance internal and international routes, but not on the short routes and not on the aircraft industry. The latter found its internal market diminished by one-half, and complained of the buying program of the Luft Hansa. Another cause for protests arose when the Luft Hansa did not remain a pure operating company, but erected repair, reconstruction and research workshops of its own, instead of having this work carried on by the industry. Moreover, it was evident that small independent companies were able to operate short tourist, shuttle and miscellaneous services more efficiently than the Deutsche Luft Hansa.

Thus it came about that in the winter of 1928-29 the adversaries of state monopolies demanded the dissolution of the Luft Hansa, or at least the restriction of its activity to the operation of large internal routes where it had worked most successfully. Short lines were to be left to small regional companies, and interternational expansion, to the aviation industry. It was demanded that the restrictions by the Ministry of Communications on the small operating companies and on miscellaneous flying (newspaper transport, advertising, taxi service, aerial photography, crop dusting work, etc.) to be abolished, and that the Luft Hansa be freed from the fetters of a too intimate connection with the Ministry in 1929.

These dissentions in German aviation brought about a result which nobody had foreseen. When in the spring of 1929 the German Reichstag was discussing the budget for the financial year 1929-30, rigorous economies were demanded because of the impending inauguration of the Young plan. The members of the body, under the impression that there was something wrong in German aviation, as evinced by the dissentions among aviation men themselves, cut the aviation budget in half. This reduction of funds occurred in spite of the fact that by the elections of 1928 several prominent aviation men had come into the Reichstag for the first time.

Since this session of the Reichstag took place during the period of transition from the winter to the summer schedules, the Luft Hansa had to delay for six weeks putting the summer schedule into effect. When it was known that the subsidy had been cut in half, the Luft Hansa was forced to eliminate several important lines—including those across the Baltic to Czechoslovakia and Austria, to Cologne and to Hamburg, as well as a number of short routes—to reduce the seasonal services to watering places and seaside resorts, to curtail the preparations for its extensive Europe-to-the-Far East and Europe-to-South America projects, and to reduce its personnel by one third. Several important routes were taken over by Belgian and French companies, and most of the short routes went into the possession of the competitor of the Luft Hansa, the Nordbayerische Verkehrsflug A.-G. This company also took over a portion of the Luft Hansa personnel and experienced a sound development during the summer.

While the subsidies of the Luft Hansa had been reduced by half, those of the German aviation industry had nearly been abolished. The central government, however, advised both groups to procure whatever amounts had been curtailed by a foreign loan, for which it would secure the interest and mortgaging service. Negotiations with an American banking group were entered into, but, because of the critical situation in the international money market, the conditions for these loans were such as to make them inacceptable for the Luft Hansa as well as for the aviation industry. When, therefore, the Reichstag assembled in November for the purpose of voting several supplements to the budget, it was compelled to allow the Luft Hansa and the industry nearly exactly the amounts of the subsidies which had been cut away half a year before.

There is only one enterprise which remained badly affected after this action—the Deutsche Verkehrsfliegerschule, the German school for commercial pilots. This situation has been severely criticized, for a reduction in the production

(Continued on page 98)

LONG-WAVE RADIO RECEIVERS IN AIRCRAFT

By

Herbert Hoover Jr.

Radio Technician, Western Air Express

IN the last article an effort was made to show in a general way the value and benefit of radio in aviation. Particular emphasis was placed upon the weather reporting and ground organization that the Department of Commerce has built up for the protection of commercial companies and civilians.

Courtesy of Radiomarine Corp. of America

An airport radio set for receiving weather reports

Hourly broadcasts of weather information and landing conditions are now being made throughout the twenty-four hours from Hadley, Bellefonte, Cleveland, Bryan, and Chicago, on the New York to Chicago route. They are being released from Hadley and Boston on the New York to Boston route, and also from Hadley, Washington, Richmond, Greensborough, Spartansburg, and Atlanta on the New York to Atlanta route. On the Chicago to San Francisco route they are made from Chicago, Iowa City, Omaha, North Platte, Cheyenne, Rock Springs, Salt Lake City, Elko, Reno, and Oakland. From Seattle to San Diego reports are broadcast from Seattle, Portland, Medford, Oakland, Fresno, and Los Angeles. On the route from Chicago to Fort Worth these reports are broadcast from Chicago, Kansas City, Wichita, Tulsa, and Fort Worth. Stations are also in operation at St. Louis, La Crosse (covering St. Paul), and Key West, giving reports on all of the airways leading in and out of those points.

As an example of how these reports are made, a copy of a recent hourly broadcast from Glendale (Los Angeles) is as follows:

"This is the airways station at Glendale giving the hourly broadcast of weather conditions in the southern part of California.

"Glendale: Overcast with light rain, ceiling 2800 feet, visibility one-half mile, wind, light, northwest, temperature 39, barometer 30.04.

"Saugus: Overcast, ceiling 1,000 feet, visibility 10 miles, wind 3 miles from north, temperature 32, barometer 28.78, slush and snow in south pass.

"Fresno: Overcast with moderate snow falling, ceiling 500 feet, visibility one-half mile, wind 10 miles, east, temperature 34, barometer 29.93, field slippery with one-half inch of snow.

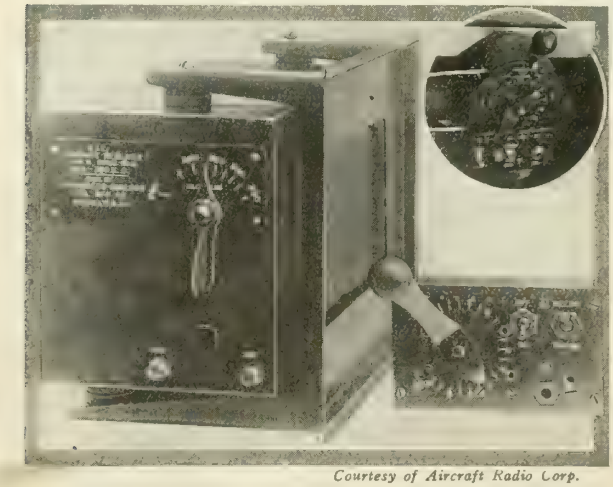
"Oakland: Overcast, ceiling 3,000 feet, visibility one-half mile, wind 3 miles, east, temperature 48, barometer 29.80, confine landings to east of yellow flags on center of field."

(Additional reports were given for San Diego, Oceanside, Dana Point, Bakersfield, Livingston, Livermore, and Mills Field.)

"The airways stations at Glendale is signing off at 11:10 a.m."

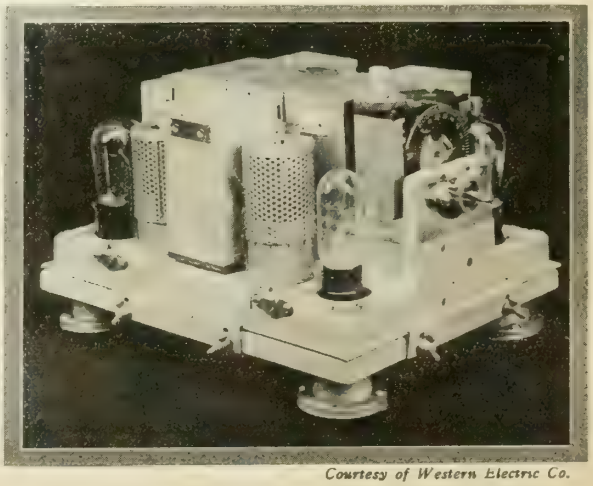
The Department of Commerce has more than done its share towards giving us radio protection. It has established radio telephone broadcasting stations on the ground at intervals of about 200 miles along practically all of the airways of the country. In addition, it is installing radio beacon stations to aid in navigation of planes while they are in flight. By marking out the actual route with a radio beam, it is possible to follow a correct course when familiar land marks may be invisible because of darkness or poor visibility.

It is up to the commercial transport companies and individual fliers to show their good faith by making



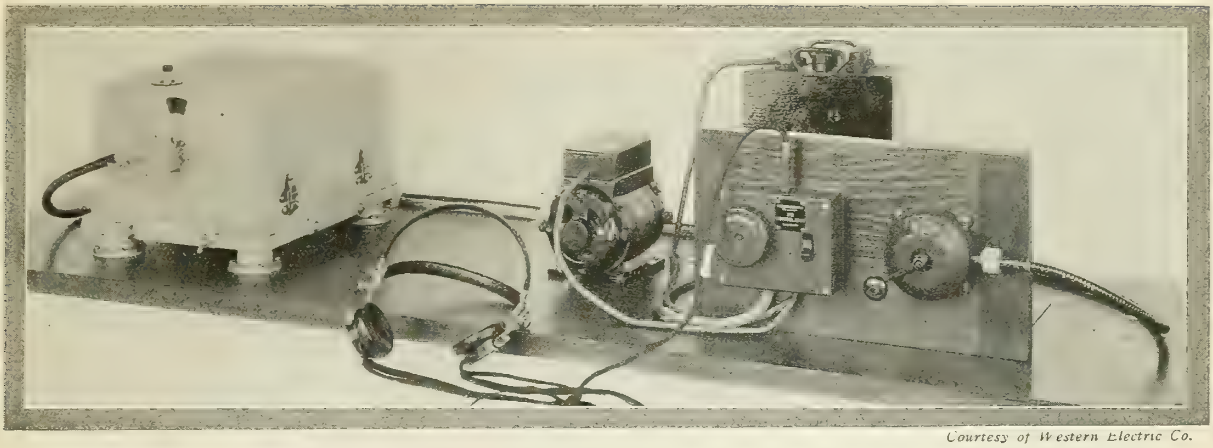
Courtesy of Aircraft Radio Corp.

Direct control panel for beacon receiver; inset, remote control dial



Courtesy of Western Electric Co.

An aircraft radio receiver with the cover removed



Courtesy of Western Electric Co.

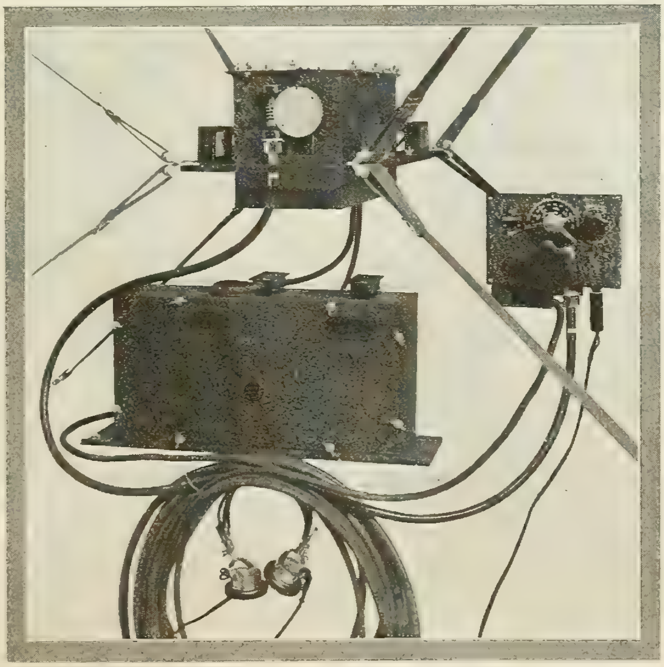
A remote control airplane receiving set with pilot's control board, flexible control shaft, and battery operated dynamotor

use of the service now that it is available to them.

One of the most necessary things in connection with any airplane radio installation is to have the ship thoroughly shielded and bonded. This is so important a subject that all of next month's article will be devoted to this particular phase of the situation.

The next problem is to choose a receiving set for the plane and to install it properly. In order to get the Department of Commerce weather reports and beacon signals a radio receiver is necessary which has been specially designed for this use. Such receivers are now manufactured by Stromberg-Carlson, Radio Corporation of America, and the Western Electric Company. First of all it must be able to tune from about 500 kilocycles (600 meters) to 250 kilocycles (1,200 meters).

The terms "meter" and kilocycle" are often confusing, but as a matter of fact they are interchangeable. It was usual to refer to "meters" until a few years ago, but because of certain engineering advantages the expression "kilocycles" has now come into general use. To convert one into the other it is only necessary to divide the wave-length in meters into 300,000 in order to get the equivalent frequency in kilocycles, or to divide the frequency in kilocycles into 300,000 in order to get the equivalent wave-length in meters. To avoid any confusion in this series of articles the wave-length in meters will be put in parenthesis after the frequency in kilocycles.



Courtesy of Radiomarine Corp. of America

Weather report and beacon receiving set as mounted in a plane

Another requirement of such a receiver is that it be sufficiently sensitive to pick up distant stations. This is a very hard thing for which to set up a definite standard without getting into technical terms. The same thing holds true in regard to its ability to select between two or more stations which may tune close to each other. In any event the final test is actually to try them out under normal operating conditions, and see if they will adequately provide the reception required of them. Any of the companies now manufacturing this apparatus will be glad to arrange such a demonstration.

A very important requirement for any piece of aircraft radio equipment is that it be mechanically rugged, and yet light and compact. It should be well insulated against jolts and vibration by some method of rubber shock absorbers. There will still, however, be some vibration transmitted to the apparatus itself, and care should be taken that the parts will not jar loose, or that its operation will not be affected in any way. This is a very important point, for it has been found that an otherwise fine piece of apparatus will occasionally be completely shaken apart after 50 or 100 hours of flying. The weight of a receiver complete with power supply, tuning controls, and headphones, should not be more than thirty or forty pounds.

In choosing any instrument, whether it be a transmitter or receiver, it is very desirable that all of the parts be readily removed from the plane for inspection or adjustment. The various units should be independent and bolted down with thumb screws. The connections should be of the "plug-in" sort, enabling the apparatus to be released instantly.

Most of the apparatus that is now available has been designed for remote control, so that the receiver may be placed in the rear of the plane and the adjustments made from the pilot's seat. This has three big advantages — First, that the receiver itself will not be in the way of the pilot in the cockpit; second, that ignition interference is reduced to a

(*Continued on page* 226)

THE FUTURE OF THE AIRSHIP

An Interview with P. W. Litchfield

By Robert B. Renfro

"AERONAUTICS is transportation, whether of fighting men and materials of war, or of goods and peoples on peaceful missions; and civilization will find certain use for whatever craft can carry men and goods faster than existing agencies.

"The airplane and the airship can cover long distances faster than any other vehicle devised by man. Men have ever been willing to pay a premium for speed, not for the sake of speed alone but because of time and the saving of time, which have dollars-and-cents value."

Thus did P. W. Litchfield, president of the Goodyear Tire & Rubber Company, several years ago briefly but emphatically express his opinion regarding an industry that today stands out prominently in the program of the world's advancement, progress and prosperity.

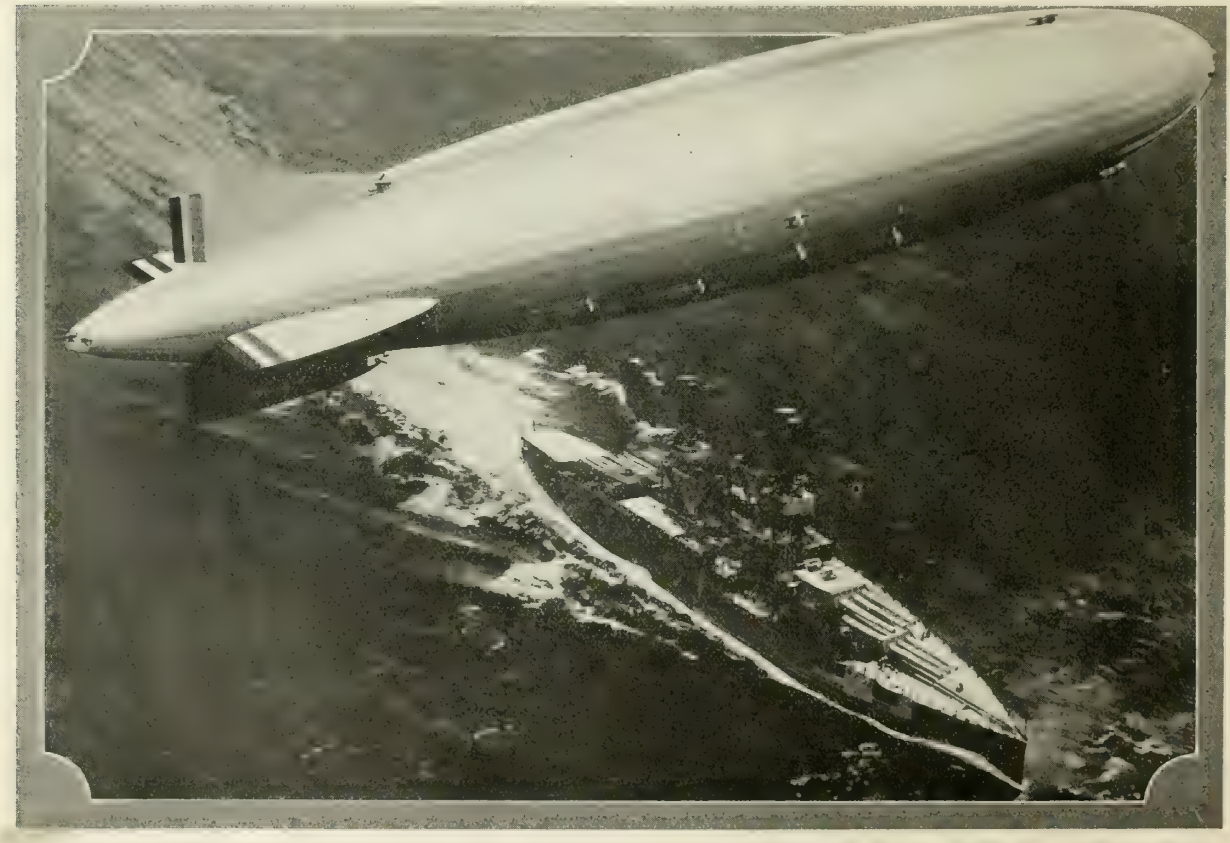
P. W. Litchfield, president of Goodyear

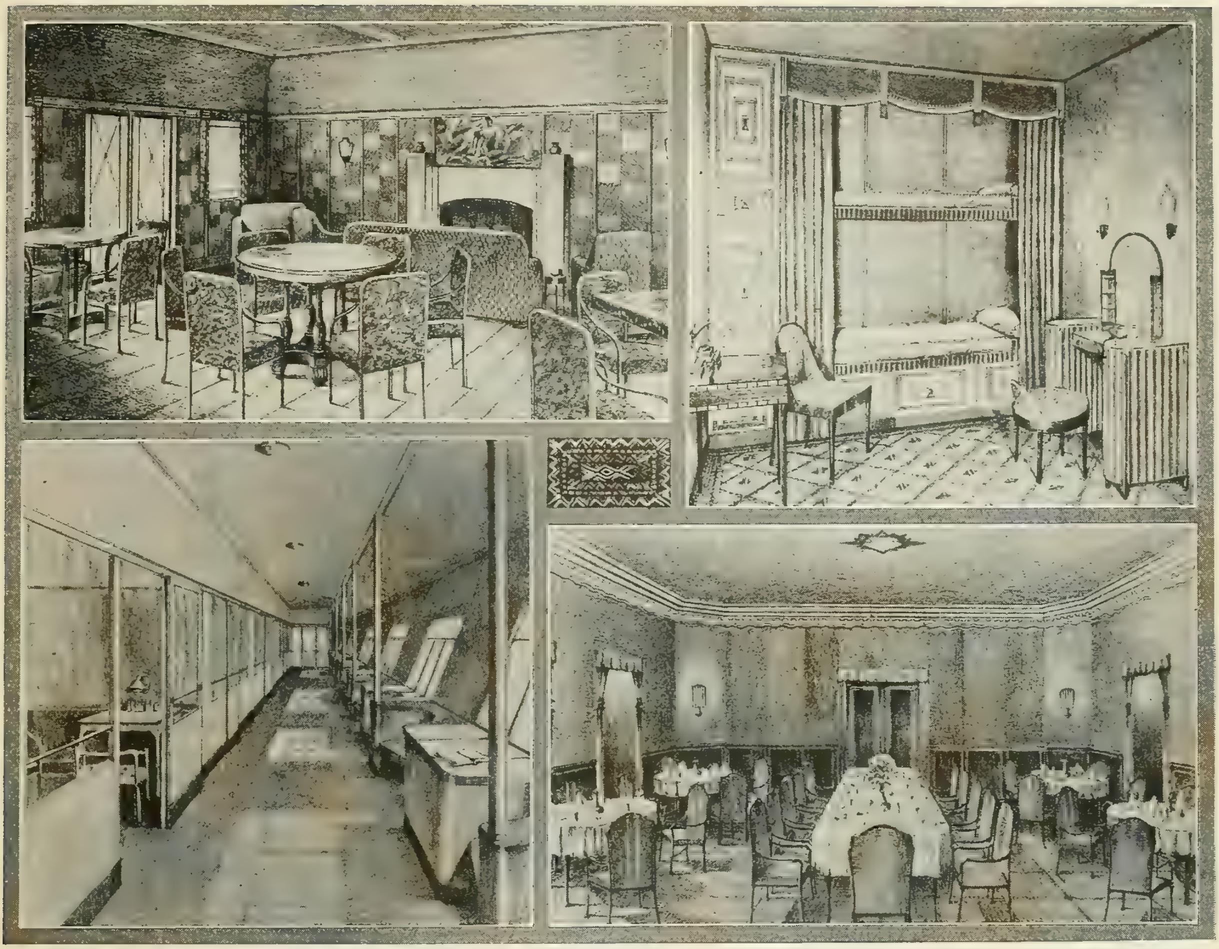
Before going into the subject of the great strides that have been made in the realm of aviation, permit me to digress for a few moments to state that I went to Akron to interview personally this enthusiast in the field of lighter-than-air, because I knew that more than ten years ago Mr. Litchfield had become intensely interested in air transportation's possibilities—he was vitally concerned with the treatment of fabric for balloons and was watching with keen interest other phases of what was then an "infant" industry.

I knew, too, that during the World War, through the efforts of the company, Goodyear had the nucleus of an aeronautic branch, and the building of Government lighter-than-air craft was carried on throughout the war period.

I was aware, also, that it was mainly through Mr. Litchfield that Goodyear was enabled to procure the German Zeppelin patents, thereby elevating Goodyear to first place in the Naval design competition that gave to Akron the American Zeppelin industry, known as the Goodyear-Zeppelin Corporation, which company has the contract to build for the United States Navy the ZRS-4 and ZRS-5, largest airships in the world.

From a viewpoint of twenty-nine years' service with the Goodyear organization, Mr. Litchfield sees a great future for lighter-than-air craft, and in my opinion he


An artist's conception of the new giant rigid airship which the Goodyear-Zeppelin Corp. is building for the United States Navy



Drawings of the luxurious accommodations on the passenger airships for the proposed trans-oceanic Zeppelin sea lines

struck a pertinent note in his address at the ring-laying ceremony of the ZRS-4, held in Akron recently, when he said:

"The building of this ship is inaugurating a new form of transportation which will have far-reaching results in future American progress. Within two years from now the ship which we are now starting will be flying through the skies, and its cruises and performance will write a future chapter in the history of our nation.

"From the lessons learned through its construction and operation, many advances in the art of air transportation will result. Faster and larger ships will follow as a result."

In all of my travels and in all of my contacts with air-minded people, I never have met a person with more confidence in the possibilities of lighter-than-air transportation than is expressed by Mr. Litchfield. He fairly bubbles with enthusiasm over the prospects.

"Transportation," he said, "has been a potent factor in making the growth of the United States one of the amazing phenomena of industrial history. And by the same token—but even more important—it has contributed tremendously to the result that from the Atlantic to the Pacific and from the Great Lakes to the Gulf our people speak the same language, serve the same flag, respond to the same impulses and are guided by common ideals.

"Lighter-than-air transportation is just around the corner and in a comparatively short time will occupy a definite place in our national economic scheme. My faith in this prediction is borne out by the fact that steps have already been taken looking to the establishment of Zeppelin sea lines, the recent incorporation of two such transport companies being the first definite action.

"These developments, as you may know, are in accord with predictions made by Dr. Hugo Eckener, head of the German Zeppelin company, in conference at Akron with officials of the Goodyear-Zeppelin Corporation and New York banking representatives.

"The International Zeppelin Transport Company and the Pacific Zeppelin Transport Company were incorporated in Delaware. The International represents a participation of German and American Zeppelin financial and aeronautic interests which are studying the project of building two 6,500,000-cubic-foot Zeppelins at Akron and two at Friedrichshafen, Germany, with suitable operating docks on both sides of the Atlantic. The Pacific company is purely American, studying a line between American ports in California and Hawaii, later to be extended to the Philippines. A hangar in California for construction and operations, with a mooring mast in Hawaii and an operating hangar in the Philippines, would probably comprise the ground bases necessary for such a line.

"In both the Atlantic and the Pacific the airlines would coöperate with steamship lines."

For these decidedly forward steps in the program of air transportation and for the encouraging indications that these far-reaching plans are to be carried to fruition, much of the credit generally is conceded to Mr. Litchfield.

(Concluded on page 98)

THE READY LETTER WRITERS

By

Cy Caldwell

WHEN I was a bit of a lad going to school—and I must have learned precious little there, or I never would have taken up writing as one of my trades—we had a course called English Composition, although the teacher, a long-suffering bachelor who had lost half of his hair and all of his patience instructing the young, used to remark feelingly at times that a more fitting name would be English Decomposition. Almost invariably he would make this remark after correcting one of my themes, during the process of which correction he would pause and gaze upward hopelessly as though imploring Providence to give him strength to continue to the bitter end. He died at a comparatively early age, while I was yet at school, and although the cause of his demise was said to have been heart failure, I recall a feeling of guilt in my young and tender soul at the disquieting thought that I had, perhaps, unwittingly hastened his end. Certainly I did the poor fellow no good; for an ancient copybook, relic of those bygone days, informs me only too plainly that the labor of reading my early struggles with English was quite enough to wear down the most iron constitution—and poor MacKenzie was not strong.

And now, when I am grown old and feeble, retribution has overtaken me; at a time of life when I need—nay, when I demand—peace and quiet, I am buried under an avalanche of manuscripts, letters, complaints, demands, threats, and what not. Truly, the ghost of poor MacKenzie—if it is not still busy correcting students' themes—must be gazing down upon me with sardonic mien and enjoying my predicament. MacKenzie, you are revenged for all the anguish that I, in my youthful ignorance, caused you. At last I can understand the hopeless feeling that used to take command of you when you sat facing a pile of papers; at last I can comprehend why anguish clouded your brow. For I, too, suffer—and how!

It began shortly after I started writing for AERO DIGEST. The first letter that I received from a reader I can yet recall distinctly, for it marked a turning point in my life. For some two years previous to that fatal day I had been writing for an aeronautical journal—and not a soul had paid the slightest attention to me. So far as I knew, I had no readers—not a single one. But I was content with the situation. So long as the editor continued to pay me the modest sum he considered my contributions to be worth, I was content. I didn't care if any one read the stuff or not. To tell you the truth, I don't believe they did—and if they did, it served them right, so I make no apologies.

But on a certain fatal day the situation changed for the worse—though in my fatuous ignorance I thought the change was for the better. *A reader wrote to me.* He said, I recall to this day, that he had perused my last contribution with pleasure, and that he felt called upon to write and inform me of his approval. He hoped that I would continue writing—and, if I had the time, would I be kind enough to drop him a line? Would I! I should say I would! I was delighted with the chap. Here, I said to myself, is a man of discernment, a man who appreciates the finer and more subtle things in literature. I sat down and wrote him about four pages telling him how much I appreciated his appreciation, how delighted I was with him as a reader, as a man, as a brother. He replied warmly, commending me for my following article and urging me to continue and make him laugh as heartily next month as I had made him laugh this month. His sides, he intimated, were still sore from the convulsions of mirth into which I had hurled him—so sore that he had been unable to go out and look for a job, which he needed badly—and could I, out of my undoubted generosity, lend him twenty dollars to tide him over until he had recovered from his spasms of mirth sufficiently to go out and find work? Of course I could. Gladly I would have supported him for the rest of his life, the dear kind fellow! On the first of the following month, however, disaster again overtook him. He had read that month's issue, and again he had been incapacitated for labor, even for looking for labor—and would I help him out again? Would I? Well, I would consider the matter.

I considered the matter for a week, during which time I received two or three other letters from readers who also had been amazed and delighted to read my lucubrations. One of them had an article on stunt flying that he wished to submit to the Editor. But, not knowing the Editor and feeling that he knew me through my writings, it seemed the thing to do to hand me the article with the request that I personally submit it to the Editor with the suggestion that it was from a dear friend of mine and therefore should be accepted at a good price. This gentleman who wrote so glibly on stunt flying, by the way, had done no stunt flying himself—or any kind of flying, for that matter. He was a reporter, a fellow-craftsman in words, and hence he threw himself on my mercy. My mercy, by that time, was becoming somewhat strained, for another reader had written to say that, inasmuch as he had been reading me for three months, he felt that I should use my influence, if any, in procuring him a job as an air mechanic. If I didn't get him that job, he said, he would be forced to stop reading my stuff, for he wouldn't have any money with which to buy the magazine. And wouldn't that be too bad? Yes, wouldn't it?

I might, I think now, have sent my first reader—well, I was going to say twenty dollars, but I really think it would have been ten—and I might have tried to get that mechanic a job; and I did try to sell that wretched reporter's horrible scrawl to the Editor; but by that time I had received a few more letters. Details are hazy to me at this writing, but I remember clearly that each and every letter *wanted* something. The writer would begin by telling me what a delightful fellow I must be, and ended, invariably, by asking for something—money, information, help, or what have you?

Now, I am not over bright—or I wouldn't be writing and I wouldn't have spent three years in a war piling up profits for manufacturers—but even I, by that time, had recovered sufficiently from my first surprise and delight at being noticed to take cognizance of the fact that all of these pleasant readers felt that I owed them something, and that they should collect. The fact that I had written something of which they approved, appeared in some inexplicable manner to have placed me in their debt! Just how they had arrived at this conclusion was not immediately obvious to me; but that all of them, with a unanimity that demanded consideration, felt that I owed them a variety of things, was not for a moment in doubt. They had read me and approved of my writing; hence

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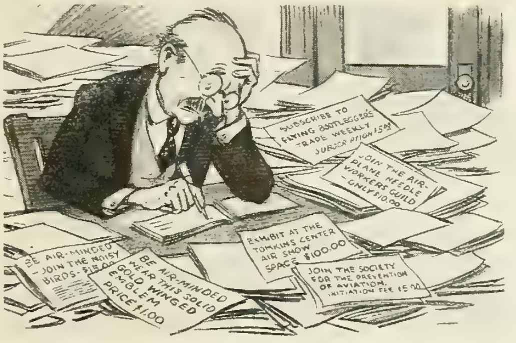
WHAT Do You MEAN—"AIR-MINDED"?

By George I. Stich

President, Aero Supply Mfg. Co., Inc.

FOR the last ten years I have been watching the country grow air-minded. I have carefully observed the increasing number of air shows, air tours, air circuses, air journals, air clubs, air committees, air dinners, and air lectures, all of which were planned for an obvious purpose—making people more air-minded. The gospel has been preached as no other subject—religious, political, industrial—in modern times.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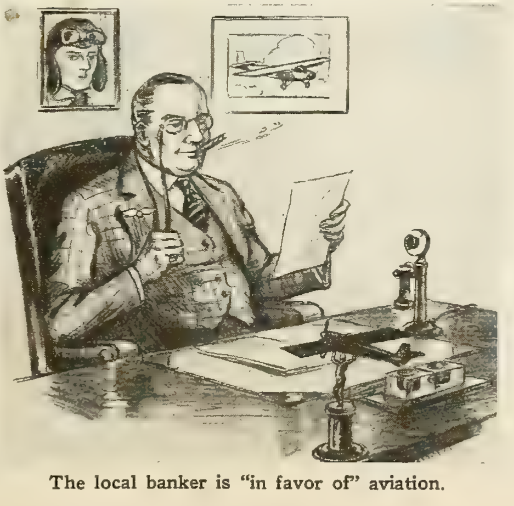
"I am deluged by invitations to be air-minded."

Superficial observation indicates that the job has been well done. Air-mindedness of a sort is nation-wide. To say that any particular town is not air-minded would be to precipitate a storm of protest from its "forward thinking" leaders. Evidence in numerous striking examples would be hauled forth to disprove your indictment. The town boosters would be quick to point out that the local chamber of commerce, for instance, has an aviation committee; the mayor has a picture of Lindbergh hanging in his office; the leading bank has a model airplane in its display window, and its president has an airplane desk ornament; the leading manufacturer has painted the name of the town on the roof top of the plant; the "Business Men's Club" occasionally conducts an aviation booster meeting, which all of the industrial leaders of the community attend; the leading local newspaper carries a page of aviation news in each Sunday edition; through a special invitation, a famous flying celebrity has been brought to the city and royally entertained. Why certainly, Podunk is air-minded!

Thus are we led to concede that a host of diverse events, functions, and activities with an aeronautical atmosphere, in which perhaps we can see no material worth to the aviation industry, are justifiable on the strength of the argument that they make people air-minded.

Any person engaged in the aeronautical industry who refuses support to these affairs both morally and, alas, financially, releases an avalanche of disapproval on himself. It is regarded as little short of a breach of faith toward a worthy cause in which he, as a representative of the industry, should be greatly concerned. He is virtually placed in the light of an unworthy and insincere advocate, a back-slider in the eyes of the public.



The local banker is "in favor of" aviation.

Possibly, like scores of others both in and out of the industry, I have cleared my conscience by joining meekly in the great crusade, with a voice of approval and an open check book. As a result I have collected a great stack of aviation banquet tickets which I never used or expected to use when I paid for them. I have donated liberally to scores of aero clubs and societies, program booklets, convention dinners, shows, air tours, and the like, the actual value of which, either direct or indirect, I seriously questioned, but which I dared not refuse support through fear of being dubbed "non-air-minded."

I have lived in the hope that eventually the ultimate in air-mindedness would be attained, that a sort of peak stage would be reached which would make a continuation of the program less necessary. But on the contrary, the drive has gone on with increasing fury. My desk has continued to be cluttered with invitations and application blanks to join in the great movement. My check book said "stop," but everybody seemed to agree that people must be made air-minded. Did I dare call a halt?

I began to make a few hurried calculations on what I had spent over the last year to help make people air-minded. The totals astounded me. My common sense asserted itself and I asked myself, "What is this idea of air-mindedness all about anyway? What are the requirements or duties incurred by a person who professes to be air-minded."

Strange, I had never thought of that before, I wondered if anybody else ever had. Consequently, I began to make some inquiries among well-known people of my acquaintance who had inferred that they had acquired the air-minded sense.

One was a prominent manufacturing executive in a Middle Western town where I operate a plant. I asked him rather bluntly, "Are you air-minded?"

"Sure," he replied. "Of course, I'm air-minded. Have been ever since Lindbergh flew over the Atlantic. I'm on the aviation committee of the chamber of commerce. Yes, siree, I'm all 'for' aviation."

"That's fine," said I, "And have you ever been in an airplane?"

At this he blinked, and tried to hedge. "Well," he stammered, "No-o-o-, I can't say that I have; in fact, I never really had any desire to go up, never thought I would care anything about it."

"I don't mean that," I persisted, "I don't mean fly for the thrill. I mean have you ever flown on a regular trip, on business?"

"Nope," he answered, "I always use the Pullmans. I'll admit I don't know so much about air travel; I know that our town has an airline running out of here because I helped boost it and get it established, but aside from that—well, to tell the truth, I'm a little bit too old to go trying those new-fangled things. I always like to keep one foot on the ground,—but don't get the idea that I'm not air-minded. I'm

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AIR—HOT AND OTHERWISE

Safety will Insure Aviation's Prosperity!

By Frank A. Tichenor

PERHAPS, among other little matters, we in this industry had better wake up to the necessity for safety. Aviation isn't going over in this country until it gains the people's confidence and it won't do that until we make it safe! The sooner we feel sure of that the better off we'll be.

It's possible, not even very difficult; but everyone must help. The fools who take the risks must be eliminated. Planes and their inspection must be considered far more carefully than they ever have been.

Perhaps the influence is already under way. It may be that of those two young men, David C. Beebe and Major Reed M. Chambers, World War fliers. Eighteen months ago, or thereabouts, they organized the United States Aviation Underwriters, Inc., and now represent thirteen of America's leading companies—Aetna Insurance Company, Globe & Rutgers Fire Insurance Company, Hartford Fire Insurance Company, National Union Fire Insurance Company, North River Insurance Company, Pacific Fire Insurance Company, St. Paul Fire and Marine Insurance Company, United States Fire Insurance Company, Hartford Accident & Indemnity Company, Maryland Casualty Company, New Amsterdam Casualty Company, New York Indemnity Company and United States Fidelity & Guaranty Company as underwriting managers. They have undertaken a Loss Prevention Campaign to reach the entire industry—with a slogan that tells the story:

"Safety Will Insure Aviation's Prosperity."

This had to come. A campaign that would bring the executives, the pilots and the airport managers and mechanics to a realization that seventy-five per cent of accidents and fires in the industry to date have resulted from sheer negligence or recklessness on the part of men whose mere presence in the industry should have been an actual insurance against anything of the sort.

Why has this situation come about? Perhaps because flying has been principally a sporting matter during peace, and a combat matter during war—with slight regard for safety habitual either in sport or warfare. The man who risks his life in sport is thrillingly applauded. The man who risks his life in combat thereby may win a battle. But to be reckless in that peace-time aviation which we are now trying to build up is sheer dam-foolishness—a threat against the industry, which, also, we are trying to build up.

These boys who are heading the new movement deserve every credit for facing facts as they actually are, and for ability in formulating plans for the education of all others in the industry to the serious results which continued carelessness must have. The companies which they have induced to join the movement deserve full credit, too, for backing an educational campaign which will help everybody in the industry. The cost of a crashed plane is nothing by comparison with the loss of public confidence which a crash is sure to cause. Without public confidence, passenger traffic cannot be created.

A very large proportion of such losses in the industry can be eliminated if the present crazy rivalry for speed and breaking records of one kind or another can be substituted by a rivalry for safety.

When it is found that a pilot's carelessness has been responsible for an accident, this should be made known to the whole industry through some central information bureau, so that that pilot may be compelled to change his ways or to stop flying.

That spirit of rivalry and devil-may-careness, built up during the war and through the influence of contests, has served to protect the reckless and irresponsible. It must stop, or its final victim will be the industry itself.

Every pilot in the country should ask himself this question: Which is better for me and my employers, flying which will build public confidence in flying by getting passengers to destinations safely, though as unsensationally as a horse-car might deliver them, or "brilliant" flying which will thrill (and frighten) them and make the crowd gasp at the "airman's" daring, and which experience has shown in the end may kill both passengers and pilot and wreck the company's valuable property? The answer which his reasonable brain would give would be a cure for all bad flying habits.

Many a good pilot has gone to his death, taking others with him into tragedy, as the result of the determination not to be outdone. Better to be distanced, and live on, than to make a record of defying obstacles and die.

The same dangerous spirit often is exhibited by operations managers who endeavor to make records when conditions are against them. Every loss of a mail cargo builds up resistance among the public, thus preventing bigger mail loads, and adds to opposition to appropriations down in Congress. Such influences are far more harmful than those of off-schedule trips, far more financially unprofitable than loss of revenue through an uncompleted journey.

We now have approximately 25,000 licensed students. These boys must not be saturated with the thought that it is necessary to take chances in order to establish reputations as good fliers. And the time to stop the influences which are working in the opposite direction is—RIGHT NOW.

The public has been convinced that planes can travel far and very fast. During 1930 let's convince the world that American planes, at least, can travel safely. That, and only that, will mean a rapidly growing air transport business and prosperity in all branches of the industry.

Safe flying will mean lower insurance premiums, for these are regulated, in the last analysis, by the industry itself. Every loss claim that is settled really is paid by the industry, not by the insurance companies, for it must be paid out of accumulated premiums, and if losses are too frequent premiums must rise.

Analysis of accidents by the Department of Commerce shows that the majority are the result of carelessness or inexcusable bad judgment, meaning to the companies not only high insurance and crash losses, but that greater loss which comes from lack of public confidence.

No business will be lost through carefulness, and money saved on crashes and insurance would go a long way toward providing research work for the development of methods and devices to make possible that bad weather flying which under present conditions would be far better left alone.

While there was a reasonable increase in the number of passengers carried during 1929, not more than half the planes' capacities was used. Think out what would result in profits if 100 per cent were to be used in coming years.

The empty seats were (*Continued on page* 250)

ALMA MATER TRIES HER WINGS

By George Gardner

WOULD a college man fly? Could he care for an airplane? Now ask us if an air transport company likes its paying passengers and we'll have three easy questions to answer.

Just to show what college men can do as fliers, Percy de F. Warner of New York University and Charles L. Morris of Yale seated themselves at the controls of their planes a few months ago and started an intercollegiate air derby between the East Coast and Columbus, Ohio— Warner leaving from Roosevelt Field, L. I., and Morris from New Haven. Warner won, gaining possession for himself and the New York University Flying Club of the first trophy for an aerial event of the Intercollegiate Aeronautic Association.

The trophy had been offered by the Ohio State Aeronautical Society, which was host to the representatives of nearly a score of college flying clubs at a conference in Columbus in November. Warner and Morris, racing to Columbus, were at the same time on their way to take their places as delegates of their clubs at the meeting.

So pleased were the men at the conference with the interest taken in their first air derby that they began immediately to discuss plans for an air meet. If these plans are carried out, a flying team representing the clubs in the Intercollegiate Aeronautic Association, all of whose members are in the East or the Middle-West, will travel to the West Coast to compete with fliers in the Western Universities.

Besides being a further step in intercollegiate competition in the air, one reason for the existence of the national association, such an air meet would be the means of interesting Western colleges in the national body.

The Intercollegiate Aeronautic Association has been in existence since last spring, when it was organized in Detroit during the aeronautical exeposition. It includes three clubs that maintain full flying schedules with airplanes, two more that have been doing work with gliders, and several others that will begin to fly as soon as they can get planes.

The problem of buying, renting or borrowing a plane is the greatest difficulty the men have to face. Usually the clubs have had to rely upon some one member with means to obtain a plane of his own, and with the generosity to permit the other men in the club to use it.

The New York University Club was especially fortunate in this respect. Percy Warner obtained his Eaglerock plane by winning the essay contest for college men sponsored by J. Don Alexander, and he has let it be used as a club plane.

Eaglerock biplane used by the New York University flying club

About half of the club's twenty members are able to make good use of this opportunity. There are transport pilots in the club, others with limited commercial or private licenses, and others have qualified as student fliers. W. Howard Ehmann, the club's president, flies in his own plane in New Jersey.

Part of the membership is drawn from the Guggenheim School of Aeronautics on the campus. But it has no official connection with the aeronautics school, and welcomes members from the other departments of the university.

The Harvard club, although not represented at the Columbus conference, is nevertheless one of the most active in actual flying. It has been operating a plane for four years, and has done far more flying than any of the other college clubs. Its members have put in some 500 hours in the air, without a serious accident. The club is a member of the intercollegiate association, and presumably will participate in air meets that the organization may sponsor.

The Yale Aeronautical Society was founded in 1911, its members will tell you. It is supposed to have had a pusher type biplane that was coaxed into the air on occasion by the hardy group of aviation pioneers at New Haven. There are no records of the original club and it was short-lived, but the legend is accepted at Yale as truth.

It is no legend, however, that Yale fliers were supreme among college men in 1920. An air meet for college men held at Mitchel Field, L. I., in the spring of that year was won by the Yale men, who took first in a twenty-five-mile race and secured enough points by placing in other events to win the meet. This was simply a flying team, organized informally and without the benediction of the faculty, and had nothing to do with what had been the Yale Aeronautical Society.

But the movement failed to flourish in the face of faculty opposition—even the trophy won at Mitchel Field was frowned upon. Not until the reorganization of the aeronautical society in 1927 were the Yale flying men able to secure anything approaching approval from the college authorities, and they still are not permitted to have a club-owned plane.

This has not, however, proved to be an insurmountable obstacle. Since the club was reorganized, its members have flown 200 hours in whatever planes they could get. The Waco plane that Morris flew to represent the club in the intercollegiate derby was the flier's own ship.

Morris, incidentally, is a leader in the national organization. He is chairman of the executive committee appointed at Detroit to handle the affairs of the Intercollegiate Aeronautic Association. The committee was requested to continue as the association's governing body by the delegates meeting at Columbus in November. It has on its membership a representative from each affiliated club.

The original members of the national body were flying clubs in eleven universities, as follows: Yale, Harvard, New York University, University of Michigan, Carnegie Institute of Technology, University of Illinois, Purdue University, University of Detroit, Ohio State University, University of Pennsylvania, and Cornell. At the Columbus conference there were representatives also from clubs at Akron, Toronto, Massachusetts Institute of Technology, Case, Northwestern, Cincinnati, and St. Vincent's. The Michigan and Carnegie Tech clubs were the two that reported gliding activities. It is known that there are between fifty and seventy-five other flying clubs in American colleges and universities aside from those in the association.

The advantages gained by the clubs in making their organization nation-wide are more or less obvious. It is apparent, for example, that competitive flying can be arranged more easily, that new

(Continued on page 230)

THE NEXT TEN YEARS OF FLYING

A Prospectus by Some of the Leaders of the Industry

As Told To
Robert S. Clary
*Chief Editor, Aeronautics Branch
Department of Commerce*

WHAT is the future of aviation? What may we look forward to in air transportation during the coming decade? What development may we expect in the next ten years of flying?

Of course, no one knows; but let's ask some of the outstanding leaders of the aeronautic industry and find out what they think about it.

Since Detroit is the center of the automotive industry, let's go there first and talk to Edward S. Evans, president of the Detroit Aircraft Corporation. Certainly he should be close enough to the rapidly growing movement to provide the world with wings, as well as wheels, to speak with authority.

Says he:

"All of us, the manufacturers and others connected with aviation, are a little at sea as to just what the future of this great movement is going to be. It has come to us as a business in a sudden and unusual way; and those who are close to it have spent a good deal of time trying to envision its future.

"The other day I talked with W. B. Mayo, chief engineer of the Ford Motor Company, and he became almost lyric in his prophecy of the future, saying: 'I vision an airport with great airliners leaving there every minute for some part of the country. If I want to leave Detroit or New York for Chicago or Columbus, for example, I will know that I can go out to the field without worrying about schedules and take a plane that will leave for that city within fifteen minutes or half an hour, just as you would take a street car. That plane will be luxurious. It will be comfortable, beautiful, beautifully finished inside. And it will be capable of high speed.'

"Now, that is Mr. Mayo's vision. My vision goes even farther. I believe that we are going to see great airliners carrying 50 to 100 tons, perhaps with a speed of ninety miles an hour, used for transporting our freight. Those planes will burn low-priced fuel; and they will transport that freight cheaply enough for the business men of the country to use them, because one of the greatest losses in business today is the carrying of inventories.

Edward S. Evans

"I remember when in 1920 freight congestion had been terrible, and the automobile companies had come to the conclusion that they would have to stock their parts way ahead, sixty to ninety days, so that the freight embargoes would not shut down their factories; and then came the slump of 1921 which nearly ruined them all. That changed their policies. Their traffic departments commenced to rush their freight. The railroads speeded up to ten days shipments that had been taking thirty days. And today one of the biggest companies, the Chevrolet Motor Company, I am told, carries only three to four days' inventory in its factories. Think of the millions of dollars saved in inventories to the country as a whole, and the interest on that money.

"That is one of the things that air transportation is going to do for us. It is going to save investment in inventories.

"This brings us to the inevitable conclusion that air transportation is a necessity to the business of America. Our engineers today are working on planes with a top speed of 220 miles per hour. Busy executives cannot afford to use the slower transport media if they can safely, comfortably and cheaply go from New York to Chicago in an hour and a quarter, or from New York to San Francisco between dawn and dusk; nor can they afford to use slower means of transportation for freight and express if the costs of air transport are within reasonable limits.

Lester D. Seymour

"Now, there are three things which we must have in order to make air transportation popular. We must have relative safety. The larger air transport lines, I believe, are just as safe today as the railroad, steamship or any other means of transportation. But we must have more than safety: we must have people believe that they are safe.

"One of the things we must have in order to make them believe that, is plane comfort. I have ridden as long as twenty hours in one day, practically without stop, just enough to take on gasoline; and when the day was over, my bones ached and my whole nervous system was wearied from the noise of that constant droning of the propeller and exhaust in my ears. We will have to overcome that.

"The only reason people use the subways in New York today is that they are cheap, not that they are comfortable; for noise in a subway is worse than it is in an airplane. You cannot talk in a subway, but you can in a good many airplanes. The subway, however, is cheap. You can ride for five cents. Now, that is the next step: we must make our transportation by air cheap enough to be economical for the public to use. However, we have planes operating today carrying six passengers and pilot, flying at a top speed of 180 miles an hour and an average speed of 145 miles; and the cost of operation is only thirty-two cents a mile, or less than six cents a mile per passenger. That is getting down toward railroad costs, for on the best Pullman trains today rail travel costs about six cents a mile. *We are going to make airplane travel cheap.*"

Numerous other authorities agree with Edward S. Evans, that increased public support will come when transportation by air is cheap and comfortable and when people realize that it is safe as well.

Another forecast of sky travel might be obtained from the president of the Aeronautical Chamber of Commerce, Frederick B. Rentschler—who is also president of the United Aircraft and Transport Corporation, and of the Pratt and Whitney Aircraft Company. Let's go to see him for a few minutes.

"In attempting to forecast the next ten years' development in aeronautics," he explains, "it is well to distinguish between the military and the commercial fields. Since the war there have been great changes in military aeronautics, both from an equipment and a tactical point of view. During the war period what were considered high-speed pursuit ships were capable of 120 miles per hour, which is now only the cruising speed of many of our great commercial transports, whose top speed is greatly in excess of that figure. The high speed of our present pursuit ships is approximately 200 miles per hour. This comparison may be taken as a quick barometer of progress in the immediate past; but in addition to this remarkable improvement in performance characteristics, the durability and dependability of both the plane and the engine are vastly greater, Whereas the average engine of the war period had almost reached its useful life at 50 to 100 hours, most good engine types of today are fully capable of 2,000 to 3,000 hours of normal service, and very regularly may be operated 300 to 500 hours between major overhauls.

"Ten years ago Naval aviation was almost an undeveloped art. Today, with airplane carriers and catapult provision on the battleships and cruisers, the Navy is able to carry aviation to sea and to make it a most important and absolutely indispensable factor in any present-day naval engagement.

Colonel Paul Henderson

"Commercial aeronautics may be roughly divided into transport and individual flying operations. Transport includes air mail, passenger and express. Until two years ago transport operations were almost non-existent in the United States, with the exception of certain air mail lines which were being flown by the Post Office Department. Today, in addition to the transcontinental air mail, almost the entire country is covered with a network of feeder lines, amounting in all to more than 50,000 miles of daily flying—much of which is done by night. All air mail is now operated by private contractors.

'Within the past year or two, passenger transportation has grown by leaps and bounds, although until then it was almost unknown. Transportation lines operating at regular schedule are now almost nation-wide between most of the principal points. Although strictly passenger lines are not yet on a paying basis, they undoubtedly will be within a decade; for by that time the public will know very generally the advantages and safety of this mode of travel. A number of airplanes are now owned and operated by individuals and business houses for private purposes. To date, however, this field remains comparatively undeveloped—although the past few years have shown a reasonable increase in this direction.

"I look forward confidently during the next ten years to a steady growth and perfection in both air mail and passenger operations. The air mail seems definitely to have proved its utility. Passengers may now be transported at more than double the speed of any other carrier. It is certain that transport speed will be vastly improved, and 150 to 200 miles an hour in transport types is not inconceivable for the period ahead. It is believed that the market for individually operated ships will be restricted until many more airports and necessary facilities are provided. The next ten years will surely see a great change in this regard, because of the constantly increasing requirements of transport companies and the trend toward municipally owned airports.

Frederick B. Rentschler

"In conclusion it should be recognized that aviation in every way is still in its infancy. Equipment is by no means ready for standardization. The premium is still on engineering development. The greatest asset of operators and equipment companies is experience. The well financed, experienced organizations will continue to carry on with success; and more progress should be expected in the period ahead than ever previously witnessed. I look forward confidently throughout the next decade to continuous design improvement; for it must be remembered that recent ships have already obtained high speeds of more than 350 miles per hour, and it is not impossible that standard service types may some day approach such a figure."

No less optimistic is Lester D. Seymour, general manager of National Air Transport, Inc.

Says he:

"Any man who actually predicts what the next ten years will bring would have to have the imagination of Jules Verne, and would probably find himself seriously considered by his friends as a fit patient for the psychopathic ward. Nevertheless, flying will one day out-do radio in its most sensational history.

"That this will be within the next ten years is quite probable, for that period will see the attainment of majority by those who are hardly more than children now. To this oncoming generation we can look for that full and fearless acceptance of aviation which will mark the end of the present pioneer period. Fear of the air, and in inborn unwillingness to venture into that comparatively unknown transport medium, has been characteristic of the present generation; and this, in my opinion, more than anything else has held the art back. The next generation will be "born" to the air, as we are born to the railroad and steamship and automobile. From then on, progress in flying will be like rolling a snowball.

"The effect of this inevitable development will be felt in virtually every phase of human activity, just as has been the use of the automobile. Real estate a hundred miles from our great centers of population, which may now be bought for a comparatively few dollars, will be in great demand for the air commuter. Big business will decentralize to the benefit of millions of men and women who, perforce, are now crowded

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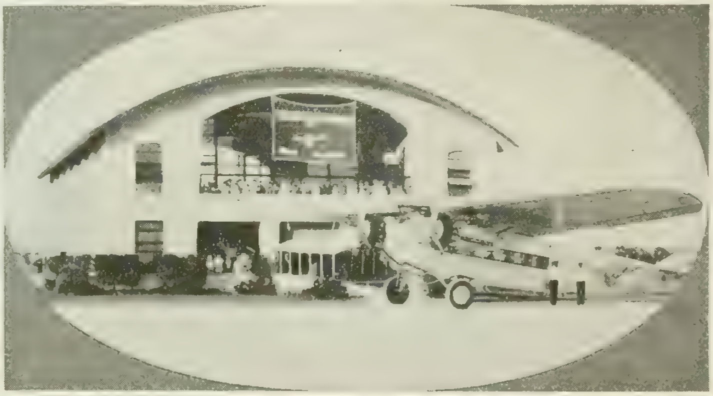
FLYING THE AIR ROUTE TO CUBA

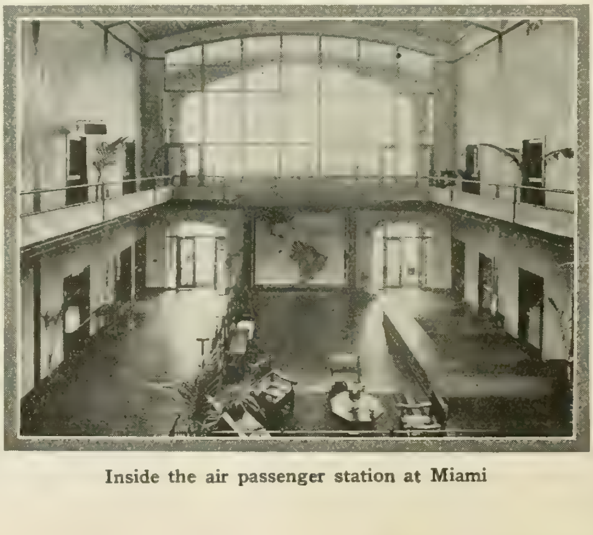
By William C. Hammond

ONE of the busiest spots imaginable is a foreign air mail and passenger terminal when the day's work begins. Between the hours of six and nine a.m., a steady stream of motor cars, of all makes and descriptions, flows into the parking area of the airport, bringing motor mechanics, plane mechanics, airport engineers, electrical and mechanical engineers, shop foremen, field managers and their assistants, operations manager, clerks, radio flight operators, radio ground crew, telephone girls, waitresses, flight stewards, draftsmen, traffic officials and a corps of assistants, U. S. Customs officials, health officers, pilots and co-pilots—each and every one an important cog in the intricate and highly technical machinery that operates, rain or shine, 365 days in the year. The foreign air mail goes out on time, to the minute.



Fokker trimotor of Pan American Airways at the Miami terminal

Plane and motor mechanics, in khaki uniforms, are busily engaged in getting the ships out on the line in preparation for the day's flying. Motor men are giving engines a detailed inspection; plane men are carefully going over wing and control surfaces, fuselages, cables and pulleys. Metal stands are placed beside engines, and two men for each ship stand by with cranks in hand, ready to start their respective motors at a signal from the crew chiefs. On several ships all three engines are purring softly as the warming up process goes on. When the engine temperature gauges reach forty degrees, each motor is run at full throttle for a moment under the close surveillance of the crew chief. When the various tests are completed, the planes are turned over to refueling crews, who fill the two wing tanks of each ship with 360 gallons of high test aviation gasoline, the lightest and most highly combustible fuel suitable. With this quantity of fuel, the planes have a cruising radius of about 765 miles or six and a half hours of flying, at an estimated speed of 118 miles per hour. At full throttle, however, these planes are capable of doing 140 miles per hour, and better.



Inside the air passenger station at Miami

In the field manager's office, a clerk is busily writing down the daily weather report for the local station. Shortly he will add to this the reports of Havana and Key West. These reports, which are typed on cards, according to their respective localities, deal largely with wind direction, wind velocity and general weather conditions at varying altitudes and strategic points. Each pilot is given a report covering the route that he is to fly, but, in order to make them as accurate as possible, these reports are withheld until the last possible moment before the plane leaves the terminal. In extreme cases, which rarely, if ever, occur, this weather information would be the basis upon which the operations manager might cancel or delay a flight if in his estimation flying conditions are dangerous to passengers and crew. In the old days, when cross-country flying was done "By Guess and by Golly," these cancelations were far more numerous than they are today with modern flying instruments and superior flying equipment.

Up in the engineering department, an airport engineer is drawing plans and specifications for a new hangar in Porto Rico, or perhaps Buenos Aires. Another plans the addition of a runway at the Santiago de Cuba field, while a third plots a drainage system for the field at Santo Domingo. The chief is going over a sheaf of reports from his corps of assistants who are stationed along the lines from the West Indies to the Canal Zone and South America.

A group of pilots, radio men and stewards are enjoying an excellent breakfast in the restaurant. The passengers for the first ship out, stroll in for a cup of coffee, bacon and eggs. Conversation among the pilots is more than likely to run to such topics as how Bobby Jones gets his distance on tee shots, or "that whopping sail fish that I caught yesterday." And occasionally you hear something about "inherent stability," or "lateral control," or "she flies hands off," but mainly from the younger pilots.

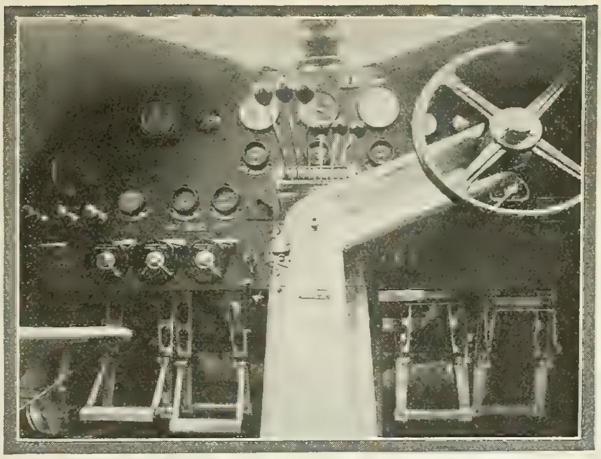
A passenger greets a friend. "Where are you bound for Joe?"

"Oh," he replies, "I'm going down to the Canal Zone for a few days" (with studied nonchalance). "Which way are you traveling?"

"Oh," says he, with equal equanimity, "I've got to be in Porto Rico by tomorrow night. That's 1,500 miles. Be there in plenty of time for a bath before dinner. Great stuff, this flying!"

One of the radio men is telling a fellow operator how he "got the Brownsville, Texas, station from 6,000 feet over Santiago de Cuba. These new sets are the berries! Heard 'em clear as a bell."

Some of the passengers who are taking their first trip by air are wondering how it is going to affect them, and are being assured by oldtimers that "There's nothing to it . . . just like riding in a limousine down a good road . . . you'll be crazy about it . . . only way to travel."



Controls and instrument panel of a Fokker F-10

Outside on the balcony the two poll parrots are telling the cock-eyed world that a plane has just started to warm up on the passenger platform and that it won't be long now. The motors start 'em squawking every time.

Downstairs the radio ground crews are taking their places before instruments, putting ear-phones over their heads, and checking sets. Each man is assigned to a certain plane for the day. It is his duty to maintain constant communication with that plane from the time it takes off from the home port until it lands safely at its destination. At any time during the flight the operations manager may reach any plane in the air, issue orders, and get replies. The pilot, enroute between point of departure and destination, may get information from the various stations and, if necessary, pass it along to other planes in the air. Warnings of bad weather ahead, or changes in wind direction and velocity are of the greatest value to those who follow. Thus the radio makes for safety in air travel.

At the first gong, the two pilots, the radio operator, and the steward take their places on the plane, and the passengers' baggage is loaded. At the second gong, passengers get aboard. A field clerk gives the pilot a detailed, last minute weather report. Everything moves with clock-like precision. At a signal from the field manager, the idling engines roar, and the plane taxies out on the runway for the take-off. On the moment set for departure time, the field manager lowers his signal flag and the giant trimotored liner runs swiftly down the runway and soars gracefully into the air, bound for a foreign airport.

Morro castle (lower left) and Havana, as seen from the air

Gaining altitude at the rate of 1,400 feet per minute, she lifts her own weight, plus a useful load of over 5,000 pounds without the slightest apparent effort. The pilot levels off at perhaps 2,500 feet and settles down to the day's work. He turns the controls over to the co-pilot and again studies his weather report, carefully checking it against conditions as he finds them. He sizes up the weather ahead, to the right and left; decides that a drift angle of ten degrees is correct; writes out the flight order for the co-pilot, who proceeds to turn the ship slightly until the compass reads exactly 205 degrees; adjusts his altitude to 2,500 feet, and holds the air speed at 110 miles per hour.

Since an airplane can be drifted miles off its course by winds, it is highly important that the pilot judge the wind carefully and accurately. He must know the wind direction and velocity at varying altitudes. At the surface a wind from the east may be blowing at five miles per hour, while at 1,000 feet it may be fifteen miles an hour. At 2,500 feet it may be blowing from the northeast at twenty miles an hour, and at 6,000 feet from the southwest at ten miles per hour. The solution of the problem is to pick the most advantageous altitude, and fly there. If, for instance, the course to be flown is to the southwest and the winds are as I have mentioned, it is but natural that the pilot would not choose an altitude of 6,000 feet, for there he would encounter a head-wind of ten miles per hour. It would be advisable to take the 2,500-foot level and thus get a helping wind of twenty miles an hour. Assume that the ship is cruising at 110 miles per hour air speed, and bucking a ten-mile head-wind. The actual ground speed is reduced to 100 miles an hour. If on the other hand, the pilot takes the 2,500-foot level and gets a helping wind of twenty miles an hour, he would obtain 110 miles plus the speed of the wind, and would therefore travel at the rate of 130 miles an hour.

Perhaps the pilot may enjoy this favorable wind for the duration of the flight; again, he may not, for winds have a very annoying habit of changing at the most inopportune times. The veteran pilot learned early in his career to respect wind velocity and direction, and no doubt this contributed somewhat to the fact that he is a veteran pilot. You know, they say that there are two kinds of pilots—old pilots and bold pilots. The bold pilots rarely, if ever, become old pilots. So the old pilot studies the signs as he flies. When flying over land he looks for smoke columns from factories or burning brush, cloud shadows on the ground, swaying branches and trees, grain fields; and if flying near railroads or highways, he notes the tendency to drift to the right or left of these landmarks. For head-winds or tailwinds, he checks his progress with his watch, or known landmarks or on the map; and it is fairly simple to judge the ground speed with sufficient accuracy.

In flying over large bodies of water, quite another problem presents itself. Naturally there are no landmarks, no smoke, except from a chance steamer, no cloud shadows and no trees. There is the radio, however, if one is so fortunate as to be flying for a company which uses

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NO MORE MONUMENTS

By Don Rose

IT IS the habit of history to put labels on its periods, so that students and such will not mix them up more than is absolutely necessary. Everybody knows, for example, that the Middle Ages and the Industrial Area are not the same thing, though a great many people couldn't tell them apart without an encyclopedia. And already there have been sundry attempts to christen our own time and century, so that some call it the Age of Steel and some the Era of Electricity and others would like to write it down as the Air Age. All of which is perfectly all right with me.

But if I should be consulted by posterity—which doesn't seem likely at the moment—I should earnestly suggest that we call this the Age of Monuments. Nothing can happen nowadays without a scramble to see who shall be the first to put up a monument about it. When the monument-makers run out of current material they go over the centuries with a fine-toothed comb to see who or what has been missed. If it goes on for a few more generations as it has in this one, the world will be so thickly populated with monuments that civilized society will be living in a cock-eyed graveyard and spend all its time falling over statues, tablets, plaques, bronzes, obelisks, towers, memorial arches and other testimonials to our ancestors.

It doesn't seem to occur to anyone that monuments don't wear very well. Either they fall down or people forget what they were ever put up for. The biggest ones don't fare much better than the little ones. The pyramids, for instance, must be conceded to be a pretty good job of building construction, and the contractor didn't skimp on material when he erected them. But there were whole centuries at a stretch when nobody had any idea who put them up or why, and even today the experts find lots of room for argument in them. And when all is said and done, nobody cares very much.

Then there are those magnificent memorials of the Middle Ages, erected to the glory of God and the undying credit of their architects and builders. Some of them have held out until now, but more of them fell down or were pushed down or were turned to some purpose quite foreign to their original intention. I have visited the poor remnant of a great church at Glastonbury, England. Where is the rest of it? Why, in every roadbed for miles around, and in the walls of barns and buildings and pig-pens.

Personal memorials don't do much better. Either they get moved out of the way by impatient posterity, or they are made into hitching posts for mules, or they get credited to the wrong party or to nobody at all. You should see, for instance, the dandy Cleopatra's Needle on the Thames Embankment in London. What has it got to do with Cleopatra? Not a thing. And then there is Shakespeare's birthplace at Stratford, the only trouble with which is that Shakespeare wasn't born there. And if you prefer to come nearer home, you may take a walk through your own city and see how many of its statues you can call by their first names or explain what was the big idea in putting them up in the first place.

All of which shows that monuments don't keep very well in this climate nor in any other. The only monuments that endure are deeds and their story. It's a queer thing, but a phrase written on a scrap of paper can outlive anything that can be made of stone or steel and be as fresh today as it was ten centuries ago or twenty. While all the monuments crumble and rust, the world keeps fresh and green the memory of a man who did something or who said something worth repeating.

All of which shows how sensible Colonel Lindbergh was when he turned down the bright idea of putting up a monument to his principal achievement to date. Probably he has been looking around a bit at monuments and noting what happens to them. And there's another reasonable possibility. The Colonel may be a little like the rest of us in disliking the idea of a tombstone before he is dead. He may prefer to think that a man's work is never finished while he is still here to do it. He may not choose to live the rest of his life in the shadow of his own reputation and under the curse of his own monument. He may have figured it out that there are some sorts of success which are harder to live down than flat failure. And so—no monuments.

In declining to have his face frozen into a marble memorial, the Colonel said that he preferred to be remembered as the boy who flew the air mail. This was more than mere modesty; it was a tribute to his trade and to his fellows in it. It was putting the emphasis of public attention where it belongs—on the job of work rather than on the man picked out by fortune for a star performance. And it was an extraordinarily good thing to say at this moment in aviation history. The public has been watching the acrobats too closely for its health or for the health of the industry. And in the meantime it has been forgetting that without flying men on business bent there wouldn't be any industry.

So once again we must give the Colonel credit for saying the right thing at the right moment and dodging another of the temptations that try to trap all famous feet. And apparently his example has not been without its effects. Even President Hoover didn't show any enthusiasm for Senator Smoot's suggestion that Boulder Dam be re-christened Hoover Dam in his honor. Possibly the President doesn't care to be remembered to posterity by a dam site, particularly one intended to supply Los Angeles with water for Saturday's bath and the wherewithal to cook cabbage. And Senator Borah had better consider the mountain dedicated to his name and honor by the one state in the Union which apparently thinks well of him. Some day the citizens of the United States will be stumbling over it without any idea that they are stepping on the fair name and reputation of a Senator.

No More Monuments. It's a pretty fair slogan, as such things go, and it fits the times. The season is ripe for more industry and less ballyhoo. The nation is ready for a time of more work and less talking about it. And aviation is uncommonly in need of a re-concentrating of effort and attention on business—which means flying, when all is said and done—and a corresponding decrease in the building of jerry-made monuments to greed and personal ambition and financial trickery and shoddy publicity which came so close to spoiling last year for all of us.

A bad weather report gets very little attention while the sun is shining, and prophets of gloom always have a tough time. Nobody will believe them while times are good, and nobody will love them when they say, "I told you so." But nevertheless, it belongs in the record that a number of observers served warning on the industry and public alike that hot-air-mindedness might be mistaken for air-mindedness and do a lot of damage before the difference was noticed. It was pointed out as plainly as possible that whenever a new industry gets into its first long trousers there will be somebody to

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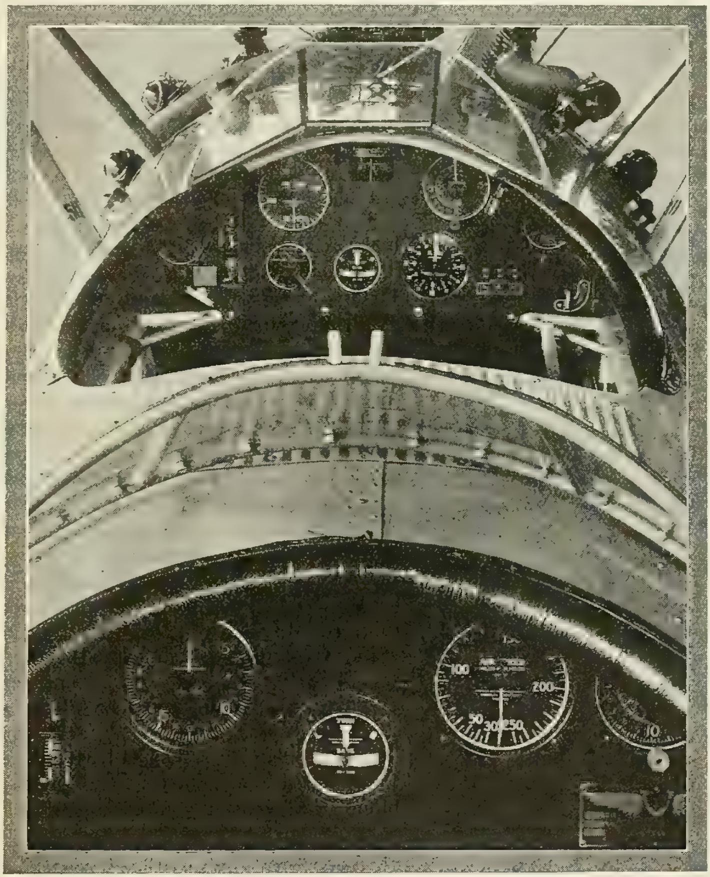
AVIGATION IN COMMERCIAL AVIATION

By Lieut. Logan C. Ramsey, U.S.N.

Formerly in Charge of Aerial Navigation,
Hydrographic Office, Navy Department

NO branch of the science of aeronautics is more neglected or misunderstood than avigation. The neglect may be attributed primarily to the fact that up to the present time mere flight itself has been the first necessity and the capability of a pilot has been judged solely by the quality of his airmanship. The natural concomitant of the public opinion in this respect has been the dismissal of avigation as an unnecessary refinement or at best as an essential for trans-oceanic flights only.

The general misunderstanding of the necessity for and value of avigation arises from two sources. First of all, certain spectacular flights have been successfully attempted with little or no aid from this source. Few have realized that these achievements have been made in spite of this deficiency. The successes have been remembered and the failures ignored. No one can state how many trans-oceanic fliers have lost their lives because of their inability to avigate, but had all of those lost been as adequately prepared to cope with the problems of avigation as was Commander Byrd in the *America,* it is safe to state that some at least would undoubtedly be alive today.


Instrument panels in both cockpits of a Vought O2U-1; note the central location of the compass and turn and bank indicators.

But, though this may account for the general opinion regarding the value of avigation, other causes have contributed toward the misconception existing at present in the aeronautical world. These causes are inadequate navigational equipment and over-emphasis of the least important branch of navigation.

Avigational instruments and accessories, largely because of the lack of demand, are at a very rudimentary stage of development. [The author's reference is to avigational as distinguished from standard flight instruments.—Ed.] In fact, if engines and aircraft were at a similar stage, commercial aviation would be only a future possibility. The only avigational instrument that is at all adequate is the turn indicator and that is used primarily as an aid to airmanship.

First in importance in avigational equipment is the compass, and no entirely satisfactory aircraft compass is available today. The magnetic compass is subject to considerable and varying errors, and is difficult to steer by. The earth inductor compass, by which it is easier to direct the course of the aircraft, is subject to the same errors as the magnetic type and in addition has certain peculiarities of its own. No satisfactory or practical means of checking the accuracy of either type while in flight has been devised.

Even if an entirely satisfactory compass were available, the avigator would still be handicapped by the lack of an accurate and easily operated instrument for determining the force and direction of the wind; which, of course, is the greatest single factor in causing an airplane to deviate from the desired course. Numerous types of drift indicators and wind determining instruments exist, but though they have a certain value, their accuracy and ease of operation leaves much to be desired.

Similar inadequacies exist in almost every type of avigational instrument and accessory on the market today. It should not be construed from this that I am decrying the utility of any of these appliances. With careful use, surprisingly good results can be obtained; the deficiencies are mentioned only as a partial explanation of the general misconception of the value of avigation.

But perhaps the greatest factor tending to mislead aviators has been that issuing from the very source from which the most correct information might be expected—the maritime navigational experts. These scientists have correctly assumed that maritime methods of navigation are applicable to aerial use only after extensive simplification. Unfortunately, few if any of these experts have been practical aviators and they have nearly all assumed that aerial dead reckoning is secondary in importance to aerial celestial observations. They have emphasized this highly technical phase of avigation until they have convinced the aeronautical world that avigation is an extremely complicated science requiring very great skill and applicable only to very long flights.

But these technicians have erred, I believe, in not realizing that, although the speed and range of aircraft are considerable, their duration is comparatively limited. The sun, on which reliance for daylight avigation by celestial observation must be placed, does not move rapidly enough in azimuth to permit the accurate determination of the position of a plane. (A single observation gives only a line of position and two intersecting lines of position are needed to give a "fix" of the position. In maritime practice it is possible to take two observations separated by an hour or so in time for this purpose. In the air, however, the distance covered by the plane between the time of two observations of the sun sufficiently separated chronologically to permit of a good "fix," is so great that the utility of the first observation is open to question.) At night, the stars are difficult to hold in the field of the sextant telescope because of vibrational difficulties, and accurate observations necessitate great skill.

For these reasons I am convinced that primary dependence in avigation must be placed in aerial dead reckoning, next in piloting, and last in astronomical observations, particularly for commercial aircraft operation. Each branch of avigation has its value and will be developed as the necessity for it becomes more apparent.

Thus far only the deficiencies of avigation have been discussed—not its value or its possibilities. The use of avigation can and will increase the *safety* of commercial aircraft operation. With accurate avigation, fewer planes will be lost with the attendant possibilities of forced landings from exhaustion of fuel supply, etc. And, inasmuch as the lay belief in the lack of the safety of aerial transportation has been the greatest drawback in the development of commercial aviation, no means of increasing its security can be neglected.

Moreover, avigation has a dollars-and-cents value to commercial aviation. Flying hours are expensive, and their cost may be computed very closly. For example, assume that the cost per flying hour of an air transportation company is $25 and that two-way service is maintained daily over a route 400 miles in length. Assume further that the schedule is maintained 300 days in the year. One plane is avigated, the other is not. Figuring very conservatively, we may again assume that the plane which is avigated will average ten minutes less flying time per trip. (In flights of only 120 miles in length, differences of more than ten minutes have been noted under similar circumstances.) In the course of a year the plane that has had the benefit of avigation will have flown fifty fewer hours in accomplishing the same work that the other plane has. The plane not using avigation will have cost $1,250 more to operate—or, to be more accurate, the use of avigation will result in the saving of that sum in the operation costs of the plane. If the capitalization of the company is $200,000 and this saving was made on both planes, the company could increase its annual dividend $1.25 on each $100 share of stock from this source alone. And the cost of the necessary equipment is comparatively negligible.

As the importance of aviation as a a part of the transportation system of the United States increases, aircraft operation schedules will have to be be maintained more rigidly. Even now the linking of air and rail transport is a straw that indicates the direction of the wind. Avigation, providing, as it does, an accurate check on the position of the aircraft, will be an absolute necessity if a time schedule is to be maintained. Recent press accounts of the new air-rail systems have commented on the fact that as yet the trains have not been forced to wait on the planes but that the reverse has been the case.

Commercially, aviation must compete with the other modes of transportation. In this competition its greatest merit is its speed. This factor must overcome the obvious disadvantages of aviation—such as greater cost, etc.—if commercial aviation is to be a financial success. This speed advantage is derived from the greater directness of the routes available, as well as from the inherently greater speed of aircraft as vehicles. Faulty avigation or any other factor that tends to increase the time of transit must and will be eliminated.

Already the Department of Commerce requires a certain amount of avigational knowledge from the holders of licenses as transport pilots. The requirement in this respect will undoubtedly be made more stringent in the near future, and it is incumbent upon commercial aviators to investigate the value of avigation or run the risk of falling behind the times.

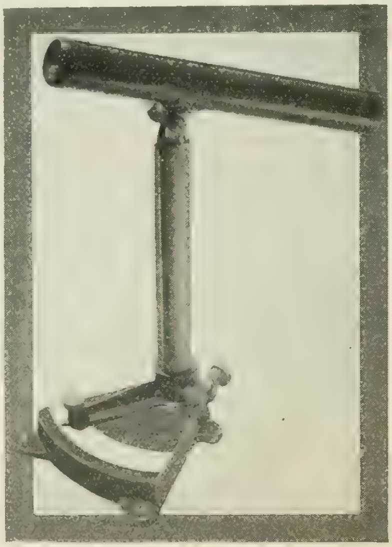
If the value of avigation is conceded, the question then arises as to what forms of avigation and what equipment will be required. A detailed discussion of this question is beyond the scope of this article, but the salient points will be mentioned briefly.

Pending the establishment of such airways as the San Francisco-Honolulu, New York-Bermuda, and other long-distance over-water routes, avigation by celestial observations may be safely considered as only of academic interest to commercial aviation within the continental limits of the United States. Avigation by dead reckoning and piloting methods, however, are of the utmost importance.

The statement regarding celestial avigation may be disputed, but will be hard to refute. In the first place, the comparatively moderate (under 1,000 miles) distances involved in national air transport are traversed too rapidly to permit the continuous and accurate determination of the position of the aircraft that is necessary for the type of operations just outlined. The avigational equipment for celestial work is comparatively expensive and requires considerable skill for its successful use. In addition, the amount of attention required by navigation by astronomical observation would involve the services of a skilled operator who would not be available for other duties and would therefore involve a large additional expense. I am not attempting to disparage the utility of aerial astronomy which is very real and necessary in its field, but I am trying to point out that that field does not include commercial air transport within the United States.

Dead reckoning, on the other hand, provides a means of keeping track continuously of the position and is universal in its application and availability. The additional equipment required is comparatively inexpensive and its use does not involve such continuous skilled attention as is involved in celestial work. In planes carrying more than one pilot, the one not actually at the controls can do the avigational work

(*Continued on page* 236)



Drift indicator Mark II, a simple instrument for obtaining the drift angle

AERO DIGEST

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WISE EXCLUSION OF THE ADMIRALS

VERY early in the course of the Naval Arms Conference at London an astounding and a hopeful sign emerged. The representative statesmen of the world's great nations decided to get on almost wholly without admirals, openly upon the basis that admirals would be mere poisonous influences if permitted to participate as they have done in previous efforts of the sort.

Hopeful, did we say? This sign of improving international sanity is epochal. The world has been an invalid since 1914, that year, indeed, merely marking a grim crisis in a long, long illness. This conference is a consultation of the doctors.

The decision to keep it free from fighting sailors, whose whole personal hope and future depend upon expenditure of billions for war machinery which if existent they will try to use, which is infinitely costly and which, moreover, in these days of aircraft is pitifully out of date, unquestionably is a sign that man's intelligence improves.

At other meetings America, England, France, Japan and all the others have missed many words of actual wisdom uttered in the cause of peace because the loud voices of the admirals have drowned them out. The protest of the Naval men that a Naval Disarmament Conference without admirals is like "Hamlet" without *Hamlet* is inaccurate. It is more neatly comparable to a consultation for a typhoid patient from which doctors themselves suffering from typhoid are sensibly excluded. In medicine we bar germ carriers. It is wise to do the same in international affairs.

THE EXCHANGE CLUBS

LAST month this magazine contained an article explaining the important place taken by the National Exchange Clubs among the forces promoting aviation. Written by J. P. Muller, president of the clubs, it contained impressive revelations of acute interest in national welfare on the part of a large body of America's best citizenship. Perhaps the interest which the National Exchange Club, made up of 800 units in forty-four states, with a total membership numbering between 40,000 and 50,000, may prove to be one of the most important influences urging toward the rapid and rational development of American aviation knowledge and enthusiasm among average citizens.

If Hire-em Bingham should have the happy thought of calling in the National Exchange Club to help out the N.A.A., it would be the best piece of celebration yet noted as emerging from that head of his, which so continually stirs the wonder of his fellow citizens. To all of the air-minded groups in the United States this unpretentious but undoubtedly useful body offers an inspiring example. Here is little talk and much air-mindedness, a novelty in these days of claims for much air-mindedness which produce no fruit but words, and then more words.

SOUTH AMERICAN DEVELOPMENT

A RECENT rumor that Pan American Airways, Inc., and New York, Rio and Buenos Aires Lines, the two groups now operating between the United States and Latin-America, are to amalgamate has been emphatically denied by the principals heading both companies. We hope obstacles to such an amalgamation are not insuperable. These organizations surely should join forces. The sooner and the more efficiently all United States interests down there are hooked up under one effective, fully competent management, the better showing we shall make in South America and the more quickly we shall make it.

If there is one place in the world where we need concerted effort and where competition between North Americans is extremely illogical, it is in the southern portion of this hemisphere, for in that territory United States enterprise must come into bitter competition with European owned and managed air transport lines. The Germans are entrenched in certain regions in South America where they have operated passenger lines for nine years (without the loss of a passenger's life); the French government subsidized Aéropostale is entrenched and planning a large expansion in other sections.

In countries where difficulties attending railway and highway construction are well nigh insurmountable, air transport becomes a recognized necessity; and such are the conditions existing in this field. American machines handled by American business and operating personnel, are ideal for profitable development by American capital.

Here is an opportunity for desirable consolidation. Our efforts in Latin-America should be the best all-United States effort of which we are capable. Little difficulty should be encountered in enlisting men such as MacCracken, Rentschler, Hoyt, Grosvenor, Fairchild and other notables equally competent to coöperate in achieving this objective. It would require no great expenditure of time to convince them of the benefits that would accrue through the merging of these lines.

Foreign companies are working down there in competition by nationalities only. The Germans work together; the French coöperate as Frenchmen. Now is the time for American companies to go down there and, through close team work, accomplish something really worth while. There is money enough, business friendship to a high degree and plenty of ability for every job from corporation president to assistant mechanic.

Such a North American enterprise throughout South America will tend to increase friendship with the South Americans; it will be a manifestation of good will, good business and good statesmanship. Lindbergh, our flying ambassador, prepared clear sky-paths for the rest of us. The industry should organize to take advantage of this supreme opportunity, with foresight enough to know that if it is not promptly done, foreign competition soon will have made it doubly difficult—perhaps even impossible.

THE AMERICAN LEGION SHOW

WE REGRET that some alleged big men of the industry should have been working under cover to divert to the Aeronautical Chamber of Commerce show, exhibitors who had signed up for space at the American Legion show in New York City, February 7th to 15th. However, such disreputable work has been done.

After months of effort to get the two shows together, the show committee of the Aeronautical Chamber of Commerce decided that a combination was impossible and broke off all negotiations toward that end. This was a real mistake, for in our opinion there are too many shows; in fact, so many that they are hurting and not helping the industry. If there has to be an annual show in New York City— and certainly there ought to be not more than one—the American Legion deserves full participatory rights in it.

When the Chamber decided against a combination with the Legion, it ought at least to have decided also to work only for its own plans and not against the Legion's.

The Legion men have earned the friendship of the aeronautical industry and they should be accorded the benefit thereof in full measure. For so-called "big guns" and their employees to shoot outside their legitimate line of fire, with the thought of injuring any American Legion man or enterprise, might be termed refined poaching. It is not only bad taste but bad business.

The day is virtually sure to come when the American aeronautical industry will find it advisable to say respectfully to the American Legion, "Let us get together to do thus-and-so for the common good of our country." Then it would be pleasant if the industry could add, "Don't you remember how we helped you get your clubhouse in New York?"

What standing will the industry have with the American Legion when the latter learns of the unfair treatment received by Aviators' Post 743, which is made up of approximately 300 men who served as fliers during the late war? Our advice to the impetuous and short-sighted gentlemen of the Chamber of Commerce is: "Think it over carefully and then try to square yourselves."

AERONAUTICAL RESEARCH

A LEADER in American aviation has been doing some necessary thinking in an effort to discover American deficiencies in industrial and technical development. To Aero Digest he explains that inadequate education is responsible for some of these shortcomings. While students of other industries get thorough theoretical and practical training so that after their studies are completed they are ready to proceed with actual work, aeronautical graduates usually show that a lack of actual practice at the school which they have attended has resulted in an insufficient knowledge and proficiency to enable them to proceed with research of their own.

Our educational training is no more lacking in original creativeness than our design and manufacture. Our larger companies, of which some are in positions perfectly adapted to pioneering work, neglect or avoid it, evidently forgetting that profitable business may be developed with bold, good engineering. This country more than any other is adapted to large plane operations, but only recently, and under foreign impulse, have we begun to build them. We showed the world how to build fast planes and then as a nation were too stingy to provide a suitable entrant for last year's Schneider Trophy event, in which a foreign plane achieved a speed of 331 miles per hour while our lone entrant, who had longed to get in this race with the hope of bringing the trophy back to America, chaffed as he read the press dispatches of the event, and wondered why our Government and industry had given him such disinterested cooperation. American companies were afraid of "wasting" time; the American Government was afraid of "wasting" taxpayers' money.

We have limited research talent because salaries of professors and associates in our schools are so low that they do not tempt men to enter this profession, which requires highly developed experts if we aspire to aviation leadership or even par. American universities offer incentives insuffiient to induce good men to devote their lives to aerodynamics and aeronautical engineering. The few research engineers we possess are so burdened with school routine that they must neglect their specialties. That means that they will soon cease to be real specialists.

America cannot hope to retain aeronautical leadership without more pioneering spirit in the industry, better engineering training, more generously supported research, especially in aerodynamics, properly equipped with wind tunnels and other necessary facilities.

MUNICIPAL AIRPORT PROJECTS AS SOUND INVESTMENTS

MANY American municipalities consider the building of airports much as they consider the building of asylums or homes for the aged—that is, as something done in philanthropic fashion, which is one of those nuisances involved in the chimera of human progress. "An airport?" says the mayor. "Later, perhaps; after we find the money to erect the statue to the great Ephraim Epiphalet Smith. Any time will do. Neither project will yield a return on our investment."

Contrary to such a notion, progressive communities should regard the airport idea as a profit-making enterprise, and not necessarily indirectly profit-making either. Aero Digest recently received a statement indicating in detail the manner in which the air terminal at Tulsa, Oklahoma, has been so managed as to return handsome profits. How many municipal enterprises turn in any profit? One would have to undertake an extensive research in the account books of numerous cities before he would find very many reporting profits.

The whole problem resolves itself into the matter of good management. William Barnwell, the assistant manager who furnished the facts about Tulsa, modestly refrains from making this observation, but the facts supplied proclaim it. For instance, profits in August amounted to $12,327.90 at this busy port; a part of the activity, the sale of gasoline, amounted to $3,374.66. Equipment is highly modern. The field maintains seven electric gasoline pumps, which results in low labor costs. Profits from storage and operations for the same month netted $973, costs having been held down to $290 through meticulously careful management.

The pilots' hotel, concessions and several small miscellaneous matters were also profit-making enterprises. In August they increased the net profit (without considering depreciation) to just above $4,000. To select other months at random from the records—in May net profits were $3,500, and in April they were about the same.

This experience of the thriving and progressive city of Tulsa should encourage every city in the country now lacking a municipal airport. Moreover, it should be an object lesson for those towns where ports have appeared to be financial liabilities. It should stimulate towns without air-fields to build ports, and towns with unprofitable ports to study the errors of management which are responsible for losses. It may be reasoned that Tulsa's profits are the result of its large volume of business, but the important fact is that good management attracts sufficient business to return a profit.

THE TRADE-IN PROBLEM IN AIRCRAFT SALES

By William W. Luftig

THE airplane industry has inherited one of the evils of the automobile business and unless checked now it may bring on an unhealthy condition in the industry. The "trade-in" or used plane problem is becoming a major difficulty confronting both dealer and manufacturer. The used plane is primarily a dealers' question because the dealers are in direct contact with it, but the manufacturers are contributing to such an extent in making the used plane a problem that it is not confined only to the dealer. Overproduction has brought the matter to the fore, but it was bound to come up sooner or later. It may even be necessary to pass special legislation to deal with its solution. In the automobile field, the used car is a cancer that is gnawing at the insides of that industry and is one of the most perplexing problems with which it has to deal. This phase of the business has reached such a stage that new car business is almost entirely dependent upon the sale of used cars. In a survey conducted by the National Association of Finance Companies it was found that dealers were required to sell an average of ninety used cars for every hundred new cars.

To the manufacturer every trade-in means the sale of a new airplane, but unless the used airplanes can be disposed of along with the new planes, the sale and production of new planes will be seriously curtailed. The profit of the dealer is tied up in the trade-ins and it is necessary for him to dispose of the used planes or else go under. In the automobile industry from fifteen per cent to twenty-five per cent of the dealers fail annually as a result of the used car situation. There will always be used airplanes and they will always be traded in for new airplanes, but as far as the relationship between the manufacturer and the dealer is concerned, unless the manufacturers limit their output to the actual requirements of the market insuring a profit to the dealer, then the used airplane is bound to react unfavorably on both the dealer and the manufacturer. A limitation in output will cut down to a considerable extent the pressure bearing on the dealers to sell more new planes than they can, and this will also permit them to refuse trade-ins where they do not see the possibility of a legitimate profit. At present the used airplane situation is all to the advantage of the manufacturer.

If we should take cognizance of the relationship between the buying public and the dealer, we find that the dealer is again at a decided disadvantage. The dealer has been forced into a position where he is buying a used airplane rather than selling a new airplane when a sale takes place. The new airplane dealer is also in the used airplane business. It is this phase of the dealer's business that will keep many experienced business men away from the airplane selling game. They will consider the business something in the nature of a horse swapping transaction in which the sale of a new airplane requires the buying of a used airplane. There is seldom any argument on the part of the purchaser of a new airplane about its price. This is taken as established and set. The dealer can, however, argue about the relative merits of one machine with another, but when the used airplane enters the transaction, the buyer has the advantage. Because of the amount involved in the purchase of an airplane, the purchaser usually shops around to get the greatest possible allowance on his used plane. The used vehicle and not the new machine is made the basis of the sale. The buyer demands more for his used airplane than can reasonably be allowed, and unless the dealer gives in, the buyer will go elsewhere to get a larger allowance. All of which results in the dealer's losing the sale or taking a loss on his gross profit. If the allowance is too large, it may mean the entire loss of his profit. The trading-in of a plane does not permit the dealer to obtain his profit at the time of the sale. The profit is then tied up in a used airplane, and as may sometimes happen, one used plane is traded in for another, so that two or three transactions may take place before the dealer can determine his profit, if any, on the original sale of the new airplane.

The trade-in practice is gaining rapidly and will become more noticeable with the increased use of sport planes by the public. The dealer must use better business methods than have generally been practiced in the motor industry, if he would not be brought to failure by too large allowances. Competent and accurate appraisal, keen judgment and ordinary business sense is necessary in the buying and selling of used planes at a profit. The airplane dealer is not merely an order taker, and success comes only to those who understand the airplane business thoroughly and know the fundamentals of good business management. The dealer must understand that he is in business for profit and that to do business at a loss means failure. Airplanes must be traded in at their worth and not with the sole idea of selling a new machine. The stock of used airplanes at any time should be limited in relation to the number of new planes bought from the factory. When giving an allowance on a used airplane offered in trade, the dealer must take into consideration the extent of the local market for used machines, because when selling the plane he will have to compete with this market. Supply and demand in the local market is the primary factor controlling its value, and its condition is only a secondary matter, although important because if it cannot measure up to the inspection requirements of the Department of Commerce, it cannot be sold for interstate flying. Values vary in different sections of the country and at different seasons of the year. The used airplane must be obtained at a price low enough so that all expenses, such as reconditioning of the plane, selling expenses, advertising, overhead, storage and a reasonable profit, when added, will permit the resale value to be such that the ship can be sold in the local market.

The used airplane problem is directly linked up with installment financing. The proportion of used plane "paper" in relation to new airplane "paper" will increase with increased sales. The large depreciation between the new airplane and the used airplane introduces a large element of risk and makes the financing more burdensome. Airplanes traded in at too high a value and sold again at too high a price are returned to the finance company when the buyer realizes that he has paid too high a price and, after the initial payment is deducted, he owes more than the airplane is worth. Unless the dealer operates his used plane department on a business basis, the finance company stands to be the loser with the dealer.

The best schemes, plans, cure-alls and remedies that can be devised by the use of

(*Continued on page 242*)

The DUTCH RISE to the OCCASION

By Paul E. Lamarche

AERO DIGEST *Correspondent in France*

THERE are perhaps more bicycles used in Holland than in any other country in Europe. In Copenhagen, where the Danes all seem to dash about on two wheels, I have had many norrow escapes in crossing their streets, but in Dutch cities, the way of the poor pedestrian is hard especially when he would attempt to cross the streets towards six in the evening when all of the Hildas, Gretchens, Willys, and Hans are pedalling their ways homeward after the day's work. I must confess that I feel very much more secure when flying in one of the Dutch planes than when I am on the streets of Amsterdam or any other Dutch city, since in the air over the dykes and windmills one cannot be hit by a bicycle, even though there have been in the history of aviation several "herren" of an inventive turn of mind who have endeavored to build a successful flying bicycle. There is yet, however, a certain amount of satisfaction in realizing that so far these kites for pedal pushers have remained quite close to terra firma and in Queen Wilhelmina's skies the Fokker continues to hold its undisputed position.

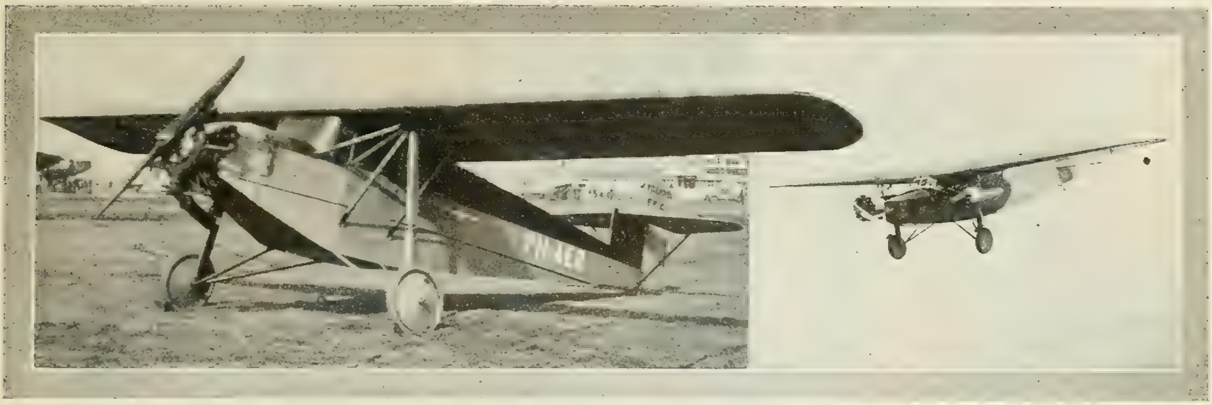
Photo courtesy of K.L.M.
A single-engine Fokker over the docks at Rotterdam

The Netherlands, as one knows, is one of Europe's smallest countries, her total area being 12,582 square miles and her population 7,416,420. The Dutch people are very active and progressive, and the development of their airways is characteristic of the business-like manner in which they go about their affairs. Dutchmen are known for their shrewdness and efficiency, and as regards civil aviation, they will tell you that "air traffic is not a question of politics but of business," which after all is said and done, is the attitude which should be taken for the successful operation of an air service that represents a national development. The K.L.M., which operates these Dutch airlines, is one of the most efficient air services operating in the Old World and the amount of traffic which it handles year in and year out is remarkable.

The initials K.L.M. are the first letters of the name Koninklijke Luchtvaart Maatschappij voor Nederland en Kolonien, which stands for the Royal Airways of the Netherlands and Colonies. Headquarters of the line are located in the Hague where Herr Plesman, as the director, acts as the guiding force, and much credit is due to him for the successful operation of the airlines for which he is responsible. The K.L.M. was founded in 1919 with the support of banking houses, shipping interests and commercial organizations, as well as a small subsidy from Queen Wilhelmina's government. It began the operation of its first passenger service to London in 1920, during which year its ships flew a distance of 50,955 miles carrying 345 passengers. During that same year the French carried 1,770 passengers and the British 6,383. Since the initial year the Dutch lines have spread out in many directions and the amount of air traffic which they now handle is comparable with those of the leading air powers of Europe. In 1928 K.L.M. planes flew a distance of 1,087,450 miles against 807,820 of the year previous. They carried 17,165 passengers in 1928 against 12,918 in 1927, while the amount of freight for those two years was 688 tons and 402 tons, respectively.

The routes of the K.L.M. at present cover a distance of 3,140 kilometres, but actually the daily distance flown amounts to more than this, especially during the

Photo courtesy of K.L.M.
A Fokker F-VII stops at Brussels to take on passengers while en route from Holland to Paris



Left, Koolhoven FK-41 cabin monoplane; right, a K.L.M. Fokker on its way to Hamburg

summer months when the service is augmented and there are frequently two, three or four services over the same route.

Dutch planes are now flying over four principal routes. The first of these is that between Paris, Brussels, Rotterdam, Amsterdam, Hamburg, Copenhagen and Malmo and is operated from Amsterdam northward in conjunction with the A.B. Aerotransport of Sweden. The joint service is known as the Scandinavian Air Express. There are also routes between London, Rotterdam and Amsterdam, another between Amsterdam, Bremen and Hamburg in conjunction with the German Luft Hansa system and a fourth route in operation between Amsterdam, Rotterdam, Brussels, Basle and Zurich which is run in conjunction with the Swiss Balair line.

In addition to these lines, the Dutch have recently inaugurated a new line between London, Amsterdam and Berlin, and several foreign air services call at the Dutch airports. From the time saving consideration, the services extending to Scandinavia are the most important, since they make it possible to travel from either London or Paris to Amsterdam, where connections may be made for the Scandinavia Air Express which continues to Malmo, completing the trip in nine hours. By using the boat and train from London to Sweden the trip requires thirty-six hours, whereas the trip from Paris is even longer.

Photo courtesy K.L.M.

Looking down on Waalhaven, airport of Rotterdam

The K.L.M. receives what is probably one of the smallest subsidies in Europe when estimated on the basis of miles flown; nevertheless, it has been able not only to operate already existing lines on this sum plus what it earns, but to expand its services as a result of its very economical system of operation. The K.L.M. hopes gradually to place its operation on a paying basis and a system has been carefully worked out with this in view. The subsidy which the government pays to this organization amounts to approximately $125,000, but by arrangement with the Dutch government, it will have a yearly diminution so that by 1934 the K.L.M. will be expected to operate on its own resources. We still find people who tell us that aviation is in its infancy, but this Dutch infant, which has had its tenth birthday, is growing up, and if anticipations are realized, the Dutch service will soon be able to support itself without the assistance of a paternal government.

For a long time the Dutch had been planning the establishment of an air service between Amsterdam and Batavia in the Dutch East Indies, and this past summer the project was actually inaugurated. In 1930 there will be established a regular fortnightly service across Europe and Asia in linking the Netherlands with her Eastern colonies. The Dutch East Indies are a very valuable and productive group of islands, which have a total area of 772,200 square miles and a population of 40,000,000. Commercially these colonial possessions are a source of great wealth to the Mother Country, for they produce much rubber, valuable woods, sugar cane, tea, rice, tobacco, oil and mineral deposits. Present means of travel normally require a month from the North Sea ports to the Island of Java, which is one of the most important of this Indian Ocean group of islands; yet, in a series of experimental flights in trimotor Fokkers during 1927 and 1928 well-known Dutch pilots such as Frijns and Koppen conclusively proved that the trip could be completed in twelve days, though it is hoped that when a regular service is in operation the time required for the trip can be reduced to eight days.

The Dutch newspapers gave their support and helped create interest in this project, and large commercial organizations such as the Algemeen Nederlandsch Yerbond,

(*Continued on page* 230)

PERSONAIRLITIES

BY

Cy Caldwell

TO those of the younger generation who don't know what an Early Bird is—an Early Bird is one of that fraternity of pilots who flew during the first thirteen years of flight. He is the man who flew the pre-war vintage of aeroplane when the present younger generation of pilots were toddling about in bib and romper; he is the man who sat on the front edge of an open-work box-kite and dared the thing to take him off the ground; he is the man who was already an old-timer when the war broke out. The insignia of his organization is an owl, the earliest of all the Early Birds, for he has been up all night.

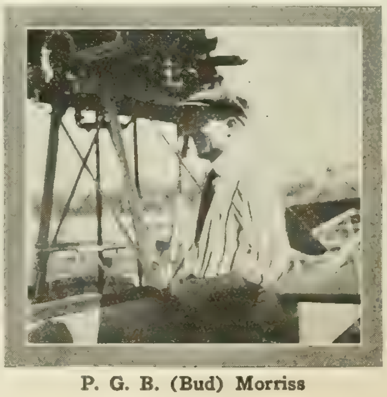
* * *

SOME time ago I said of a pilot that "he was born in the Shakespeare country," and two readers wrote in to ask where that was! I didn't think I had any readers that dumb, and so replied; but one of the bimboes came back at me and said if he wasn't that dumb he wouldn't be reading my stuff. What reminded me of that was the biography of P. G. B. (Bud) Morriss, an Early Bird who says he was "born in 1884 in the Shakespeare country." Consequently, when I have to report that, bearing my previous experience in mind, I had better come right out—for the benefit of Bobbie Vance and Bill Nye of San Francisco—and say that the Shakespeare country is in England. And since some one else is sure to write in and ask who Shakespeare was, and whom he flew for, I may as well clean him off the slate, and save postage by stating that he was an actor-manager who was incidentally a playwright, but is remembered as a playwright who was incidentally an actor. He wrote plays that are greatly admired—in conversation—by people who actually prefer the Follies.

Bud Morriss and Will Shakespeare were born near the same place, but Bud emigrated to America and Will stayed in England. He had got mixed up with a girl called Ann Hathaway—and, from all accounts, she had—so Bill just stayed in England. Besides, the Shuberts weren't producing in those days, and all he'd have got over here would have been one-night stands. That was years ago, when Custer was playing the tank towns and long before the show died on the road and was referred to ever after as Custer's Last Stand. Shortly before that Sitting Bull had been seen standing up—he was on a vacation. I knew his wife, Standing Cow. But all this was years ago, when Bud and I were young.

Anyhow, Shakespeare stayed in England, waiting for Columbus to pry enough jack out of Queen Isabella to fit out an expedition to discover America. But he was so slow at it—Commander Byrd would have had the coin in half the time—that Shakespeare finally passed away, leaving Bud Morris to emigrate here alone. Because Bud had always admired a country that could produce such giant intellects as Big Bill Thompson, Tom Heflin, Hi Bingham, and soldiers suitable for the General Staff, he came over here for mental stimulation, and felt the urge of American life to such an extent that last year he was able to organize Eastern Air Express, as general manager, and installed the line between Miami and New York.

But Bud was a long time getting to that dizzy eminence. At the age of fifteen he was apprenticed to the *Lyderhorn*, a four-masted barque, and by the age of twenty was fourth mate of that vessel. All that stood between him and a captaincy was a captain and three other mates; but they refused to pass away, so he remained fourth mate. At the age of sixteen he had run away from the ship and served two months with the irregular troops in the Boer war, until the army found out that those irregular troops were regularity itself compared to Bud. So back he went to the *Lyderhorn*, made five voyages around the Horn, and then, when he was twenty-one, was shipwrecked on the quicksands off the coast of Germany.


P. G. B. (Bud) Morriss

After that he became a vaudeville performer until they found out what was wrong with the vaudeville, when, at the age of twenty-three, he went to Canada and took out a homestead. But he put it right back a year later and came to the States, becoming a wireless operator and later assistant engineer to Marconi Wireless Telegraph Company at the age of twenty-five. Just for diversion he started hopping with a Bleriot and did his first solo in early 1911—"one staggering drunken circle," he says.

Now, at last, he had found his proper sphere, and really worked at it. In 1911 he joined the American Eagle Aircraft Company (not Porterfield's present company), and in the spring of the same year, flying with McCurdy at Palm Beach, was the first man to receive wireless signals in flight. Then he joined Curzon Aviators and tested various freaks during 1911, most of which resolutely refused even to leave the ground. Ideal ships to test, I'd say. Later in 1911 Bud became vice president and sales engineer of Benoist Aircraft Company in St. Louis, and in 1912 sailed for China to discover that one should not sell airplanes on credit to a country enjoying a revolution. All he brought back from China was somebody else's laundry and a recipe for chop suey.

Well, this Bud person fell lower and lower, ending up as a magazine publisher; *Aero & Hydro* was the atrocity he perpetrated for a year until Benoist rescued him and sent him back flying, to crash in 1916 in Michigan. This unsettled him so that he wrote "Practical Aeronautics," though there was nothing practical about it at that time. This book was the basis for a correspondence course that has been responsible for turning the minds of several thousand plumbers' and butchers' apprentices from their natural work. As though this wasn't enough damage to do the youth of the land, Bud Morriss in 1917 organized the Morriss Airplane School in Chicago, lingered for a moment, then fell with a deadly thud into the position of gob in the United States Navy, where he polished brass so industriously that they made him Executive Officer of Aviation at the Great Lakes Aviation School near the machine-gun belt of Chicago. They couldn't keep the fellow down at all. Even in 1919, when they threw him out—peace having broken out so disastrously in November, 1918—Bud kept on sneaking into the air, off and on, and is now doing general consulting work in New York, where he ought to become a chiropractor, for he knows all the joints.

(Continued on next page)

Only two

out of 1730 prospects were "too busy" to see this *flying* representative!

A NEW product to sell . . . the largest and most up-to-date hotel in New York City. Hundreds of prospects to be seen . . . located in 60 cities in every part of the country. Only one man available . . . and a 15,000 mile trip to be made in 60 days!

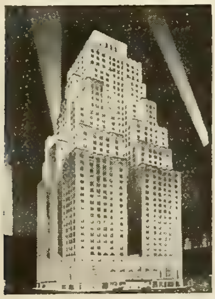
Obviously older transportation methods—the railroad or automobile—were far too slow. There was only one way to cover the ground, and that was to *leave* it. A Curtiss Robin was chosen. The trip was made—through sun and rain, storm and cold—without a hitch.

This was a carefully planned sales campaign. Letters were written to leading bankers, department stores, travel agencies and hotel managers—1730 in all. They were told when Mr. H. Stevens, Assistant Manager of the New Yorker Hotel, would be in their city. Only two of the 1730 prospects were "too busy" to see the man who had such an important message that he flew all the way from New York to deliver it. Even if these personal calls had not been made, this "flying" trip would have paid for itself three times over in publicity values alone!

An unusual case? Not at all. Large enterprises now regard the airplane as essential business equipment—as the nearest thing to having a man in two places at the same time. And every day more and more sales managers are turning to the Curtiss Robin for those important "flying" trips that must be made.

With more than 40 strategically-located airports of the Curtiss-Wright Flying Service, and distributors practically everywhere, the reliable service that keeps planes in perfect condition—by Curtiss-trained mechanicians—is never more than an hour or two away.

There's a definite need for a Curtiss Robin in every line of business—ways in which it might be used to increase sales and profits. For particulars as to how a Robin might best serve you, address Dept.-70


THE HOTEL NEW YORKER

CURTISS-ROBERTSON AIRPLANE MFG. CO.
Division of CURTISS-WRIGHT CORPORATION
Sales Offices: 27 West 57th Street, New York City

CURTISS ROBIN

For Business
Pleasure
Training

(Personalities continued)

IN SEPTEMBER, 1927, Speed Holman and E. E. Ballough won first and second place in the transcontinental air derby, New York to Spokane, and first and second place in the Spokane to Portland air derby; in September, 1928 these boys, in two ships, made a record non-stop flight from Chicago to New York in four hours and forty minutes; in September, 1928, Ballough won second place in Class B transcontinental air derby, Chicago to Los Angeles; and Holman and Ballough took first and second place in Los Angeles to Cincinnati air race; in January, 1929, made dawn-to-dusk record flight from Miami to Chicago in one minute less than ten hours' flying time, and eleven hours, five minutes' elapsed time; on May 30, 1929, Speed Holman won the Gardner Trophy Race and at the National Air Races at Cleveland he won the closed course race for planes with engines of 800 cubic inch displacement; in January of that year he had flown from Minneapolis to Chicago, 350 miles, in one hour and forty-eight minutes, averaging 194 miles per hour.

E. M. Laird

In every event, the ships used by these pilots were designed and built by E. M. Laird of Chicago, whose airplanes with black-lacquered body and gold wings are a delight to see. The perfection of finish of Laird planes may be duplicated but cannot be surpassed; they are really beautiful ships. As to their structural strength—when Speed Holman can do outside loops in them without tearing the ship apart, you may readily believe that they are built strong enough to withstand a landing by Charlie Levine or myself. And you can't say more for any ship than that.

Back in 1910 E. M. Laird became interested in aviation, building a number of small flying models until 1913, when he designed, constructed, and taught himself to fly his own airplane, a small biplane with a 12-horsepower engine: the lowest powered successful airplane of that date. In 1915 Laddie Laird, as he was called then, flew at various fairs throughout the country, getting press headlines such as: "Daredevil of Skies Startles Butte," and "Youngest Loop-the-Loop Artist Thrills City." Those were the days! Now you can't startle any one with anything. Everything has been done. But back in 1915 we could be startled by flying, shocked by young women smoking cigarettes and using an over-dose of rouge, and even four years ago we could be knocked cold by a flapper in short skirts. Now all is disclosed and we see life for what it is—a disappointing affair. In fact, the pendulum has swung back; we're covering up the women—or the style-makers are—and in two years we'll have our illusions again—perhaps. We may even be thrilled by airplanes again, but I doubt it. The things have become part of big business.

But in 1914, '15, and '16, when Laird was touring the country and laying the foundation of a national reputation, the world was young and spoiling for a fight. Laird was put in the Aviation Section of the Signal Corps to instruct the youth of the land what to do in order to get mentioned in "War Birds" by Elliott White Springs, some years later. Laird kept at this good work until the Armistice, when he went back to designing and building a two-seater sport plane powered with the great Gnome of fifty straining, and frequently over-strained, horses. This ship so impressed William A. Burke of Okmulgee, Okla., that he invited Laird to start a factory at Wichita, where he produced America's first truly commercial plane, the Laird Swallow, carrying three people behind an OX-5, which before that had always staggered into the air with only two folks and not even a dog. In 1923 Laird sold his interest to J. M. Moellendick, a partner, and the firm became the Swallow Airplane Manufacturing Company. Laird moved to Chicago, bought himself a pistol and a bullet-proof vest, and so has managed to survive there ever since. He hopes to live until he is an old, old man—by which time Chicago's municipal airport on the lakefront will be completed. In other words, Laird hopes to live to be at least a hundred.

* * *

DID you know there was an airplane factory on West 43rd St., New York City, not far from AERO DIGEST office? There used to be, in 1910, when beer was 5 cents a glass, and a free lunch thrown in. I don't mind the passing of the factory, especially, but I do regret the beer. The factory was in the back yard of a boarding house on West 43rd and was run only in the evenings, after his other work, by Julius Kowall, now living at 86 North Eighteenth St., East Orange, N. J. When the machine was far enough advanced, Kowall moved it to what is now Roosevelt Field, but was forced to suspend production for lack of funds, an experience that is not unknown even at this date. He pawned his watch and went back to New York to make more money, then took flying lessons from George W. Beatty, to the pleasant tune of $25 for fifteen minutes. In those days fifteen minutes was a lesson and cost $25, which then had as much purchasing power as $50 today. At that rate first instruction would have cost at our present valuation of money some $200 per hour. (Casey Jones is letting you boys off cheap, you see.) It took Beatty nine months to give Kowall four lessons totaling one hour, by which time he was declared ready for solo. Away he went, survived the experiment, and was an aviator by the grace of the gods.

Julius Kowall, as an Austrian war flier.

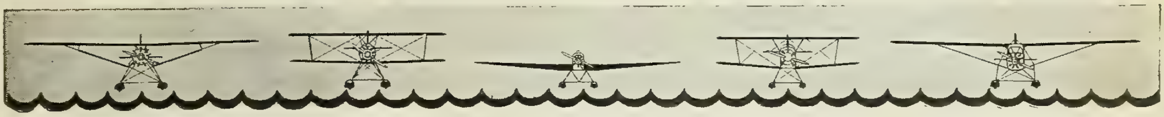
Kowall's 1914 monoplane with a 35-horsepower motor

Flying at that time were Hamilton, Fowler, Hoxey, Moisant, Baringer, Prodgers, Harriet Quimby, Deperdussin and Kowall, who revived his dream of building an airplane, and in 1914 produced a monoplane in which he flew successfully in the States and in Europe, where he was flying when the war broke out. He states: "I was then an Austrian subject and was drafted in the army. We had to go through a training course, regardless of whether we could fly or not. As I had had considerable time in the air my advancement was rapid; and as we had only a few pilots to go to the front, I was soon rushed off to the Serbian front, where I did my first war flying. It was tough, very tough. So few people today realize the unlimited efforts put forth by the Early Birds; or give them credit for what they have put into aviation. Their efforts are reflected now in the superior equipment the boys fly. We were sent out to fight and never asked about the weather. We had three enemies against us: the weather, the enemies on the ground, and the enemies in the air. As the war went on, the pilots, not of one nation but of all nations engaged, developed flying; the manufacturing companies changed designs and improved the flying qualities of the machines in response to the suggestions of the pilots. From their experiences the war pilots contributed most valuable data, which changed the crude, inefficient planes of the early war days to the machines of 1918, some of which were as efficient as the machines of today."

Kowall mentions a fact that I have often thought of. It has become the custom to consider the planes with which we finished the war as being crude affairs compared to the planes of today. So they were. But the advancement made in the last eleven years, starting from what we had at the end of the war, has not been as startling

(Continued on next page)

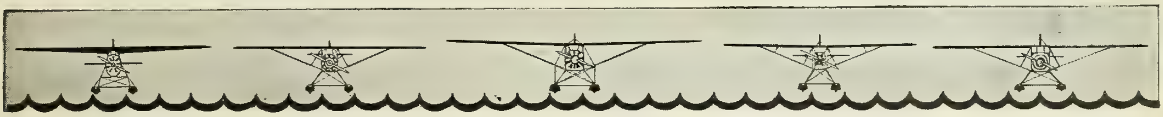
EDO THANKS THE AIRCRAFT MANUFACTURERS


Bellanca "CH" 300 · Waco 10 · Aeromarine—Klemm · Consolidated—"Fleet" · Travel Air—"SB 6000"

WITHOUT the helpful cooperation of the foremost aircraft manufacturers, EDO could hardly have won its justly deserved position as the world's leading maker of civil aircraft floats. It is working hand-in-hand with the nation's greatest aeronautical engineering staffs that has enabled EDO designers and craftsmen to produce float installations that are scientifically correct in design and performance.

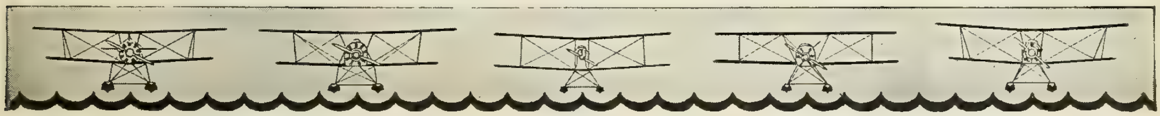
To these aircraft manufacturers EDO is grateful, and pledges itself to continue to produce floats as efficient, as durable and as trouble-free—just as perfect as modern aeronautical science can make them.

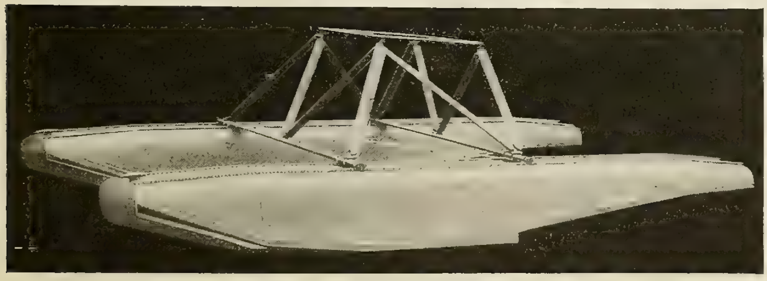
EDO Floats are now available in 11 standardized models suitable for land planes up to 8250 lbs. gross load, in accordance with U. S. Department of Commerce regulations. Already more than 40 distinct types of land planes have been EDO-equipped—with complete float installations interchangeable with the wheel landing gear. All of the planes shown on this page have been granted licenses as EDO-equipped seaplanes.


Lockheed "Vega" · Ryan "B-5" · Travel Air "SA—6000" · Curtiss Robin—Challenger Motor and Wright J-6 165 · Stinson "SM—IF"

EDO invites the cooperation of other aircraft manufacturers—and extends to them the facilities and benefits of years of experience devoted solely to the design and manufacture of floats and their attaching gear. EDO is prepared to develop and furnish complete float installations for any land plane and assures these manufacturers and their distributors unbiased protection and cooperation in developing a seaplane market for their machines.

The tested EDO Sales Plan has proved a wonderful profit-builder—and enables manufacturers and dealers to cash in on the tremendous and ever-growing demand for convertible—land or sea—planes. For particulars about EDO floats, and details of the EDO Sales Plan, address EDO Aircraft Corp., 610 Second Street, College Point, L. I.


Travel Air S 4 D and S B C—4000 · Stearman C-3 B · "Gipsy Moth" · Commandaire 5-C-3 and 3-C-3 A · Travel Air "S E 4000" and 2000



EDO

THE FLOAT MAKERS

(*PersonAIRlities continued*)

as the advance made in the four years following the start of the war in 1914. Probably no four years in the history of aviation ever have seen or ever will see such strides as were taken in those four years. They were the magic years of airplane development; and for that wonderful development much of the credit is due to the old war birds, to the ones who gave their lives at the schools and at the front, and to the ones who returned to the prosaic affairs of peace: like actors who have played their part in a great melodrama on which the curtain has fallen, to leave them wandering aimlessly from the stage to obscurity.

* * *

Gen. Frank P. Lahm

BRIGADIER GENERAL FRANK P. LAHM, A.C., was born November 17, 1877, at Mansfield, Ohio, and was graduated from the United States Military Academy in June, 1901, when he became interested in balloons, was licensed by the Aero Club of France as a balloon pilot in 1905, and in September, 1906, was the official United States entrant in the first Gordon Bennett International Balloon Race, which he won by making a flight of 402 miles from Paris, France, to Flying Dale, England. In 1908, piloting the first Army airship, called Dirigible No. 1, Lieut. Lahm was certified as an airship pilot by the Aero Club of America and was a member of the board that conducted tests of the Wright airplane which was purchased by the Army. After the trials, Lieut. Lahm was instructed as an airplane pilot, and was soloed by Wilbur Wright at College Park, Maryland, in the fall of 1909, winning his Aero Club aviator's license. In 1913 he received the rating of Military Aviator.

He was the first American airplane passenger, and the first officer of any army to go up in the air. He flew with Orville Wright in a type B plane with a 30 to 35-horsepower Wright motor at Fort Meyer, Virginia, on September 9, 1908—the exact date, as it happens, when I entered a bank with the intention of becoming president. It is now, twenty-one years later, not even an intention. Aviation ruined a good banker. But it helped Lieut. Lahm to become a Brigadier General. In 1909 he again flew with Orville Wright on a flight of one hour and twelve minutes, setting a world's record for passengers in an "endurance flight." Yes, sir, that was an endurance flight, back in 1909!

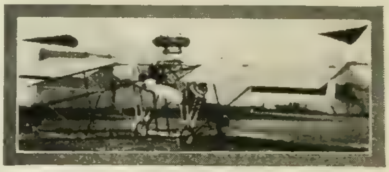
At the beginning of the World War, the greatest crime that ever has been perpetrated on dumb humanity, General Lahm was secretary of the Aviation School at North Island, San Diego. He was ordered to command the Balloon School at Omaha. After visiting training schools in England and France for study, he was assigned to Headquarters, Air Service, A.E.F., to organize the Lighter-Than-Air Service, which supplied targets for German pursuit planes on the front, thus having added greatly to the interest and gaiety of the war. Whenever the doughboy, tired of mud, would look up, he would see one of General Lahm's balloons going down. The war of 1914-18 was probably the last war in which balloons will be used for artillery observation; future observation must, of necessity, be done by airplanes. I doubt, however, that the General Staff will discover the truth of this statement until the next war. They never *discard* old ideas; they let old ideas die a natural death.

General Lahm organized and commanded the Air Service of the Second American Army, and for his splendid work was awarded the Distinguished Service Medal with the following citation: "For exceptional service. A balloon pilot of marked ability and scientific attainments, he rendered valuable service to the American Expeditionary Force by his untiring devotion to the innumerable problems which faced the Air Service during its organization in France. His broad experience in aeronautics played an important part in the formulation of policies of the Air Service and was reflected in its successes during the St. Mihiel offensive and subsequently in the operations of the Second Army."

He was also awarded the Legion of Honor, France, and the Portuguese Order of Avis. Since the war General Lahm has been a member of the Advisory Board, Air Service; student of Army War College; and member of War Department General Staff. On September 1, 1926, he was appointed a Brigadier General in the Air Corps and transferred to San Antonio, Texas, where he organized the Air Corps Training Center with headquarters at Duncan Field. General Lahm has deserved these honors, which he has won by work and merit, but to my mind the greatest honor of all was to be "the first officer of any army to go up in the air." Many generals of many armies have gone up in the air, but usually not in balloons or airplanes.

* * *

IT WAS in 1907 that Dr. Henry W. Walden became active in aviation and during 1908 and '09 that he built and experimented with the Walden Tandem biplanes and the first original American monoplane, the Walden 3 equipped with an Anzani motor, which he flew at Mineola in the early part of 1910, being one of the first pilots to fly over the present flying fields of Long Island. He also holds the distinction of being one of the first crash victims, when he piled up the Walden 3 preparatory to a quiet few months in a hospital. The financial aid accorded the hospitals of the land by the early pilots has never been adequately acknowledged by those institutions. Something should be done about it—say a memorial sculptured group, depicting one of the early crates hurling itself against a tree, while a couple of stretcher-bearers, their faces wreathed in smiles of anticipation, are galloping up from the background.


Anzani-powered "Walden 3" at Mineola, Long Island, in 1910

In 1910 Dr. Walden joined forces with George M. Dyott, the now famous South American explorer, who has spent a lifetime of research among the natives of the Amazon Valley trying to find a coon who doesn't like watermelon. The Walden-Dyott Company had a brief existence, during which Dr. Walden designed, built and even flew three more planes powered with the Anzani, all of them having been of the pusher monoplane type. The Walden 7 and 8 were powered with Roberts and Hall-Scott motors. The Walden 8 was the first original American monoplane to pass the license tests of the F.A.I. and the Aero Club of America, in September, 1911. With this plane Dr. Walden obtained his F.A.I. pilot's license No. 74. In 1911 and '12 he operated a school at Mineola, flew at the Brighton meet, Nassau Boulevard International Meet, Kinloch Meet, and others. He was the first commercial aviation advertiser on a large scale, paying for ads that occupied half pages of newspapers. The benefit that he derived from this is that he still has the ads pasted in his scrapbook!

Dr. H. W. Walden

He built several more machines, of which the New York *American*, ever famous for veracity, says on July 9, 1911, "The best ever produced at the Long Island incubator. Amongst the most attractive aircraft that sail through space." Unfortunately the only space they're sailing through today is the space afforded them in this column. But the Doctor may soon rectify that condition,

(*Continued on next page*)

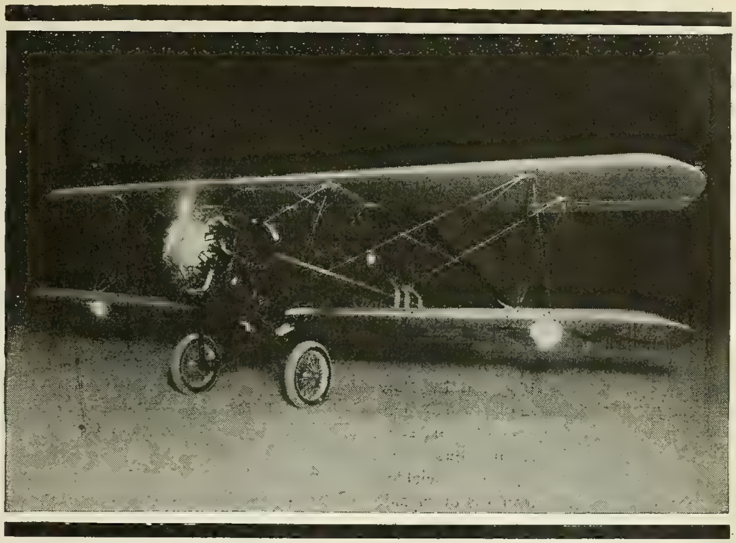
Use of the Gosport communication system enables an instructor to direct a student's training while in flight.

In all acrobatic flying at the Spartan school both instructor and student wear modern parachutes as shown here.

A Spartan training plane, photographed from a companion craft, during formation cross-country flight training.

Students in advanced classes get valuable flying experience in this modern Spartan school cabin transport.

Spartan C-3-165, powered with the Wright "Whirlwind Five," one of the types of training planes used by Spartan.



SPARTAN TRAINING SPECIALIZES IN EVERY FORM OF FLYING . . .

FLIGHT training at the Spartan School of Aeronautics introduces the student-pilot to every form of flight he will experience as a commercial pilot. First he learns the simpler maneuvers and masters landings in a dual-control training plane equipped with the Gosport system of communication between instructor and student. Steadily he progresses to solo cross-country work, cabin plane flying, solo flying in a high-speed bi-plane, acrobatics and finally, night flying.

The Spartan School of Aeronautics is one of few in America licensed by the Department of Commerce as Transport Ground and Flying school. This requires that all instructors and all training planes be Government-licensed and that every Spartan course of instruction measure up to Government standards.

COURSES—Spartan offers three courses qualifying graduates for license examinations in the following grades: Private, Limited Commercial or Transport Pilot. Each course includes technical, theoretical and business subjects.

Two other special courses qualify graduates as expert Mechanics or Welders.

EMPLOYMENT SERVICE—Spartan operates an employment service for students. Openings are investigated and expert assistance is given the qualified graduate in making a professional connection.

FREE AIR TRANSPORTATION—Southwest Air Fast Express operates tri-motored Ford planes to Tulsa from St. Louis, Kansas City and Springfield, Missouri; Oklahoma City, Oklahoma; Dallas, Fort Worth, Wichita Falls and Sweetwater, Texas. Spartan will pay the air fare to Tulsa from any of these cities for those enrolling in the Transport or Limited Commercial course, or half the air fare for those enrolling in the Private Pilot or Mechanic's course.

SPARTAN SCHOOL OF AERONAUTICS
TULSA, OKLAHOMA

MAIL THIS COUPON

SPARTAN SCHOOL OF AERONAUTICS, TULSA, OKLAHOMA.

Gentlemen: Please send me literature or information on subjects checked below:

☐ Illustrated booklet describing all Spartan courses.
☐ How I may make use of the Spartan extended tuition payment plan.
☐ Particulars concerning your offer to pay my air transportation fare to Tulsa.

NAME____________________ AGE________

ADDRESS ________________________

CITY________________ STATE __________

(PersonAlRlities continued)

for he tells me that he is again going to enter the business and knock off some more. During the war he was active in the building of the well-known DH9 and since then has busied himself with laboratory experiments.

* * *

GANGWAY for a naval officer! Commander Bruce G. Leighton is just coming over the side. Make way there! And it would be an excellent thing for the Navy if they made way for a hundred more like him by shoving an equal number of ancient steam fitters and sextant - wielders over the other side. And gunnery officers—don't forget to add them, and throw the gun after them. But I'll infuriate Leighton if I praise him by damning the standard salt-encrusted type of naval officer, for he is a staunch Navy man and resents bitterly any attack I ever make on his old crowd. They're all right, B.G.—they'd make fine bath attendants at Coney!

Bruce G. Leighton

It was Commander Leighton's foresight and energy, more than any other factor, that fostered the development and adoption of air-cooled engines for general service use, against vigorous opposition in the Navy. During his three years in charge of the Aircraft Power Plants Section of the Bureau of Aeronautics, he had the courage to back his judgment and purchase large numbers of the then unproved Lawrance Model J engines, the prototype of the now famous Wright Whirlwinds. Without his assistance at that time it is highly improbable that the Whirlwind would have reached its present stage, or Lindbergh reached Paris, or Charlie Levine met Mabel Boll. In fact, it is awful to contemplate what we might have missed if Leighton hadn't done his stuff. Without the aid of the Navy, Charles Lawrance could hardly have developed the Whirlwind, Lindbergh wouldn't have reached Paris, the moneyed interests wouldn't have been inflamed to start airlines, people wouldn't have gone coo-coo building factories and airplanes, and the vast development of commercial aviation would have been deferred for years. So the underlying reason for all this prosperity—momentarily in abeyance—is Bruce Leighton. I haven't heard it all blamed on Leighton before, so this is a new thought for you, presented without extra charge other than the 35 cents you paid for the magazine. And, of course, if all this hadn't happened, General Motors wouldn't have taken over Fokker, so we can say that Commander Leighton, years ago, actually was working for Tony Fokker and didn't know it.

It was in April, 1916, that Leighton began to prepare himself to work for Tony, as indicated in the clues I have run down. He went to Pensacola, a town known as the mother-in-law of Naval Aviation because of the vast numbers of young aviators who fail to escape matrimony while there. He did his first solo flight in September and was qualified on the first day of April, 1917—a peculiarly appropriate day for the purpose, I should say. From then on he flew hither and thither, as is the custom; was executive officer and squadron commander at Killingholme, England, June to Armistice, 1918, commanding the station the last two months; was with First Fleet Naval Seaplane Squadron February, 1919, to December, 1920; in charge of power plant design to June, 1924 (when he worked for Tony); was in command of Observation Squadron 3 with the Light Cruiser Division to April, 1925; aide to the Assistant Secretary of Navy to July, 1927; Plans Division, Bureau of Aeronautics, to December 1, 1928, when he resigned to become director of sales and service, Wright Aeronautical Corporation.

Commander Leighton is a keen student of Naval affairs with the ability to put on paper his views and conclusions, which are sound and also some years ahead of the views of the majority of his fellow officers.

* * *

GEORGE A. GRAY, pioneer Wright pilot, born at Blue Hill, Maine, September 23, 1882, learned to fly at Dayton, Ohio, during the early part of 1911, and was accorded F.A.I. License No. 142 on June 26, 1912, which got him away to a pretty early start for his present position of aeronautical engineer at 551 Munsey Trust Building, Washington, D. C. I give the address for the benefit of those who knew this old-timer and want to write to him.

Gray was the first pilot to fly over the Adirondack Mountains from Malone, N Y., to Saranac Lake, eighty-nine whole miles non-stop—which was just as well, considering the nature of the country. A landing in that mountainous region would have been very annoying to Mr Gray, seated as he was on the very front of an old Wright, where he could act as a buffer between the Wright and the rocks. A forced landing there, and Mr. Gray might not now be residing in Washington, D. C., where he can watch the nimble Congressmen at play in the Capitol or the equally amusing apes in the zoo. Gray was the first man to fly over Lake Champlain with a land machine, feeling, I have no doubt, very much like Clarence Chamberlin crossing the Atlantic. Once he got to the middle it required no further bravery to fly the rest of the way, for it was as far back as it was across. In a thirty-five-horsepower Model B Burgess-Wright, he barnstormed the U. S. and Canada for several years—and if I am not mistaken, I met him at Winnipeg about 1913. Anyhow, I met some pilot, and I think it was Gray, just after he had landed from a flight in which he cleared by inches the exhibition building housing prize stock from the ranges. Six inches lower, and he would have been among the bulls, like old Basil Rowe was in Santo Domingo some years ago.

George A. Gray

In 1915 he demonstrated the use of airplanes in warfare for Uncle Sam at Camp Whitman, N. Y., and Fort Ethan Allen, Vermont. In 1912 he had given similar demonstrations at Plattsburg, but in 1915 he had to show them again. It takes the Army a long time to see things. They still intend to use cavalry in the next war, in which everyone but a cavalry general knows that they will have to dismount their men and carry them around in trains and trucks. But I suppose they'll supply trucks for the horses, as well.

Gray married Miss "Jack" Stearns of Culpepper, Virginia, and together they made many flights. Mrs. Gray was the first woman to fly in an airplane in Virginia, which I hope consoled her for being married. Gray doesn't say. In the war he served as an inspector of airplanes in France, as a captain in the Air Service, thus showing his good judgment. In the next war I intend to devote my time entirely to inspecting the things. I absolutely refuse to sit in them to be shot at, to the vast amusement and profit of my old friend, Glenn L. Martin, recently moved to Baltimore to be nearer the source of supply. He has recently dedicated a song to the Navy, the first line of which goes: "O thou from whom all blessings flow, while I make profits here below." It's very pretty.

* * *

IT'S the Early Bird that gets the worm—allowing that the worm got up that early. In aviation, however, many of the Early Birds found the pickings somewhat lean, so they went back to sleep until more nourishment should be stirring. The past two years brought some of the old birds back into the picture. You may occasionally see one of them hopping about an airport and emitting feeble chirps about the good old days. When you meet one of these old-timers, be kind to him and don't pull his whiskers. Remember, he may be somebody's grandfather. The Early Bird may have had his day—but he also had his nights.

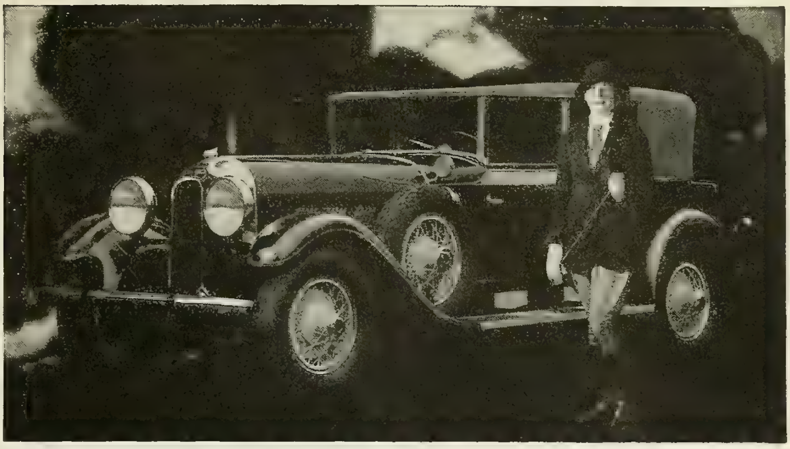


Photo by courtesy of the Auburn Automobile Company. This is the famous 120 horsepower Phaeton Sedan

Aviation takes a lesson from the automobile . . .

Where would the sales of automobiles be—millions every year—if it were not for the styling effect of beautiful lines and bright gay colors! The appeal to the eye is quite as important a sales factor as performance itself.

And aviation must follow suit. Today beauty has the call, from cigarette lighters and fountain pens right on up to houses, automobiles and airplanes.

The Murphy Varnish Company has a great deal to say on this subject. You will find it in the "Specification Manual for Aircraft". And you will find that Murphy products are designed to give not only beauty, but beauty that stands up longer, to do credit to the aircraft manufacturer and to build good-will for him wherever his ships may go.

We shall be glad to send you a copy of the "Specification Manual for Aircraft" or to demonstrate any of the advanced Murphy Aircraft Finishes.

MURPHY VARNISH COMPANY
Newark Chicago San Francisco

Murphy Aircraft Finishes

give not only beauty but *lasting* beauty

MURPHY AIRCRAFT FINISHES

Aircraft Spraying Lacquer Colored	"Z-1" Dural Primer Enamel	Aircraft Flexible Finishing Lacquer Clear
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INTERNATIONAL AIRCRAFT EXPOSITION

St. Louis, Missouri—February 15-23, 1930

THE International Aircraft Exposition at St. Louis, February 15 to 23, will be broad in scope, colorful and variegated. Cliff W. Henderson, manager of the show, has mapped out a program which will bring both aircraft and allied products in to prominence before the industry and the public.

Because of the location of St. Louis, about midway between the population and geographic centers of the country, it was found to be especially well suited for an exposition of national and international scope. Plans for the show have been under way for more than six months. The show committee of the Aeronautical Chamber of Commerce considered proposals submitted by several other metropolitan cities before St. Louis was finally selected.

This occasion will be the first since December, 1928, on which the Aeronautical Chamber of Commerce has staged and sponsored an international show. The 1928 exposition was held at Chicago in conjunction with the International Civil Aeronautics Conference called by President Coolidge to celebrate the twenty-fifth anniversary of the Wright brothers' first flight.

The air industry's interest in the "Class A" show this year has received added stimulus as a result of the extensive merchandising campaign being launched at the present time.

Exhibitors have contracted for the total floor area of the arena, approximately 300,000 square feet. Two hundred booth displays, together with the showing of one hundred new and recent model aircraft, will constitute an interesting and comprehensive exhibit. The industry will assemble not only its physical achievements, but its executive, engineering and piloting personnel to engage in perhaps the greatest trade demonstration scheduled for the year. A number of foreign exhibitors have signified their intention of shipping planes to St. Louis for the show to provide an international atmosphere for the exposition.

The Aeronautical Chamber of Commerce, which represents in excess of ninety per cent of the commercial aircraft industry, is fostering this merchandising campaign to initiate the year's activity in aviation production, sales and distribution, according to Henderson.

Among the many planes to be shown will be several of historical significance, such as Clarence Chamberlin's transatlantic plane *Columbia,* the Curtiss Tanager, winner of the $100,000 Guggenheim safety prize, and the Travel Air Mystery "S" planes, which is one of the fastest planes in the world.

In view of the extensive development and expansion of the Pan-American air services during the past year, it is felt that this market will become even more active in 1930. Considerable interest in the St. Louis show is being evinced by the Pan-American airline operators —for it is felt that the possibility of viewing at one time a comprehensive exhibit of the products of the aeronautical manufacturing industry of the United States, will afford an exceptional opportunity, especially to the prospective purchaser. The exposition should prove of mutual benefit to the Southern trade and the national manufacturer.

The past growth of the industry indicates that the current year will witness a definite tendency toward an era of increased merchandising effort. Following closely upon the first two stages of its development, namely, engineering and financial growth, the third and highly important era, that of sale and delivery, Henderson declares, will be of primary importance to those participating in the St. Louis show. The degree of air-mindedness expressed by the public has corresponded somewhat to the growth of the industry, he adds, in that the first period of mild interest and admiration, followed by an active period of investment, has now resulted in actual appreciation of air transportation as manifested in increasing support of the air mail and passenger facilities of the country.

A pageant and extravaganza, a colorful production conceived by Cliff Henderson, will be presented each night of the exposition from its earliest modes to man's conquering of the air today, and the program will include many vivid numbers presented by a cast of 150 performers. Interesting electrical effects will feature the forty-minute production.

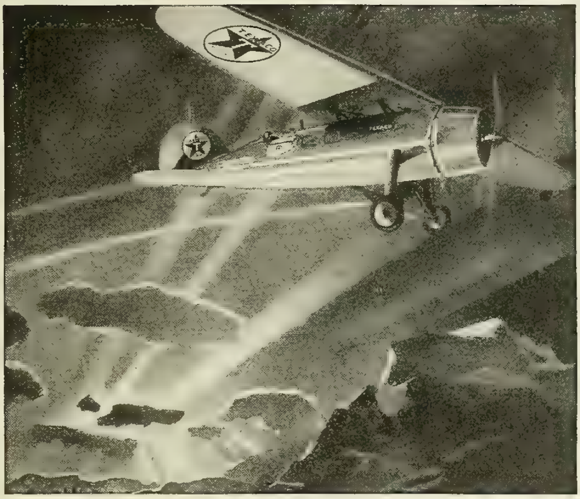
In conjunction with the exposition, meetings and conferences of various branches in association with the Aeronautical Chamber of Commerce and its component departments will be featured. Among the prominent gatherings planned will be those of the Society of Automotive Engineers and the Aeronautics Branch of the Department of Commerce together with the Commercial Airplane Manufacturers, Motor Manufacturers, Air Transport, Flying School, Airport, Distributor-Dealer, Accessory and Material, Fuel and Lubrication, and Finance-Insurance Sections of the Aeronautical Chamber of Commerce of America. These meetings will take place during the nine days and evenings of the exposition and give promise of many interesting developments along constructive lines.

Many of the country's prominent leaders of the industry, as well as noted men and women pilots, will attend the Show.

Major Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, will attend, as will such noted pilots as Col. Charles A. Lindbergh, Col. Arthur Goebel, Captain Frank Hawks, Lee Shoenhair, Herbert J. Fahy, and Henry J. Brown. Such well-known women fliers as Amelia Earhart, Gladys O'Donnell, Ruth Elder, Elinor Smith, Phoebe Omlie, Florence Lowe Barnes and Bobbie Trout will comprise the feminine delegation.

The International Exposition will not only be of interest to the trade and the adult public, but to the youth of the country as well. Realizing that the young aviaion enthusiasts of today are the potential leaders of the industry tomorrow, Cliff Henderson has included an indoor model airplane contest on the program. Four flying events to be conducted each morning in the arena, with the finals scheduled for Saturday evening, February 22nd, together with a scale model exhibition competition, will comprise the junior participation.

TEXACO ACROSS THE CONTINENT



WITH CAPTAIN HAWKS

The record-breaking flight of the Texaco No. 5, piloted by Captain Frank M. Hawks, was a notable contribution to the advancement of commercial aviation. ▲▲ A painting by Clayton Knight, the famous aviator-artist, commemorates the event. Full-color reproductions, suitable for framing, will gladly be sent to anyone on request. ▲▲ The Texaco No. 5 in this flight from Los Angeles to New York, and later from coast to coast and return in less than 37 hours flying time, again demonstrated the superior performance of Texaco Aviation Gasoline and Texaco Airplane Oil. These famous Texaco Products are available at leading airports throughout the United States. Write The Texas Company.

TEXACO
AVIATION GASOLINE
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THE TEXAS COMPANY
17 BATTERY PLACE
NEW YORK CITY

THE NEW YORK AVIATION SHOW

Auspices of Aviators' Post No. 743, American Legion

FINAL preparations have been completed for the Second Annual New York Aviation Show which will be held at the Grand Central Palace, New York City, February 7-15, under the auspices of Aviators' Post No. 743, American Legion, according to a recent announcement of Rex Gilmartin, commander of the post. Unusual interest in this year's show has been taken by foreign governments, according to Mr. Gilmartin, and several planes manufactured abroad will be included in an exhibit of over fifty planes at the show. Aircraft accessory manufacturers will display products in a separate division of the exhibition. The complete exhibition will utilize three floors of the Grand Central Palace.

The show committee has estimated that the 1930 exhibition will attract an attendance of over 30,000, basing the estimate on the attendance at the First Annual New York Aviation Show which was held at Grand Central Palace last year under the auspices of the Aviators' post. The post has a membership of over 300 fliers who served in the Air Service during the World War.

More than thirty foreign countries are represented on the Honorary International Committee of the Second Annual New York Aviation Show, according to Mr. Gilmartin, and included in the foreign exhibitions will be the Baby Klemm-Daimler in which Baron von Warthaussen recently completed a world tour; and three gliders manufactured in Germany and exhibited by the American Motorless Aviation Corporation. Included in the exhibition of planes will be an all-metal eighteen-passenger Burnelli monoplane, and the Burnelli safety monoplane. Another safety plane which will be shown is the Brunner-Winkle flying boat which has a metal hull.

In the organization of the show, special attention has been given to the arrangements of feature exhibitions, aviation conferences and other activities of interest to those in the aeronautical industry. Several planes are scheduled to be exhibited by the Museum of Peaceful Arts in addition to a wind tunnel, earth inductor compass, a model of the Langevin airship, and a Grid Glow for operating models by hand contacts. The museum plans to exhibit the transatlantic Bellanca *Pathfinder*.

A graphic display of the Byrd Antarctic Expedition has been prepared by the New York *Times* and will be first exhibited to the general public at the aviation show. The Radio Photo Division of the Radio Corporation of America has completed the installation of mechanical equipment designed to effect the transmission and receiving of photographs to and from planes in flight in England and America. The results will be witnessed from the main floor of the exhibition. The Ninety-seven Club, national organization of women pilots will maintain headquarters at the show and will present a display featuring aviation from the woman's standpoint. The organization has appointed Miss Anna Ward chairman of the committee which has charge of arrangements for the women's exhibition.

The New York State Aviation Conference on airports will be held in New York during the aviation show and members of the conference will attend the exhibition. A luncheon in honor of notables in the aviation industry attending the show will be given during the week of the exhibition by the Exchange Club of New York.

There will be exhibited as a feature of the show a motion picture demonstrating the slotted wing. The film will show how the slotted wing differs from the conventional wing construction and how it operates, in addition to other safety devices recently developed. The high speed system of photography used in making the film makes it possible to see air streaming around wing surfaces undergoing wind tunnel tests. The exhibition of the picture requires a period of twenty minutes at normal speed for pictures which were actually photographed in one second. As many as 20,000 pictures per second have been made by this process invented by a Japanese.

Other exhibitors include the Museum of Natural History, the Department of Agriculture Weather Bureau, the American Museum of Natural History and the Department of Commerce, Aeronautics Branch, which will exhibit the same as at last year's show.

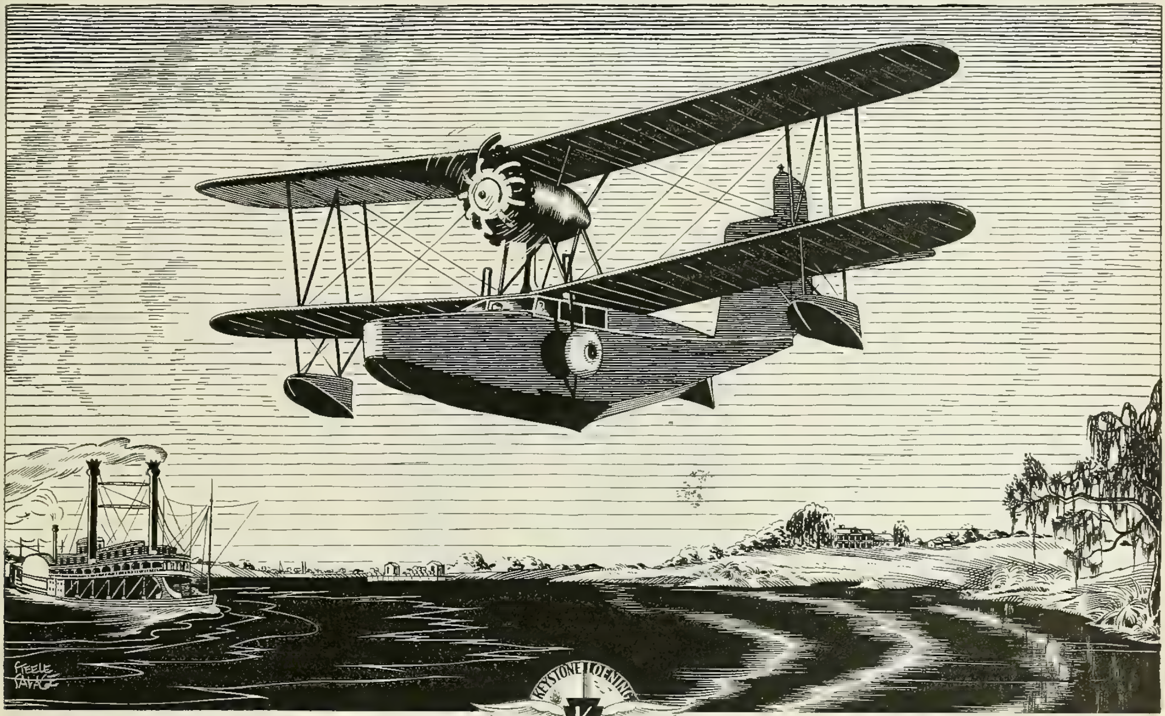
A city-wide model plane and glider building contest has been conducted by the New York Board of Education throughout the public schools in the city, and a large number of the models winning the various contests will be exhibited at the aviation show. The show committee has secured the coöperation of the New York City press, according to Mr. Gilmartin, and special aviation editions will be carried by at least five of the leading newspapers published in the city.

The glider exhibit will include the first showing in America of three of the latest type gliders manufactured in Germany. This display is sponsored by the American Motorless Aviation Corporation and will include one motored soaring model with a wing spread of fifty feet and a weight of 350 pounds. This model has a cruising speed of sixty-five miles per hour, and a top speed of seventy-five miles per hour. These gliders have been shipped from Germany and will be exhibited as the latest developments in gliders.

Members of the Honorary International Committee include the following: Rear Admiral Richard E. Byrd, Sir George Hubert Wilkins, Dr. Hugo Eckener, Rear Admiral William A. Moffett, Baron Koenig von Warthausen, Capt. Herman Koehl, Major James E. Fitzmaurice, Capt. Lewis Yancy, Roger Q. Williams, Senator J. Griswold Webb, Ralph Pulitzer, Lady Heath, and Elinor Smith.

Included among the planes which will be shown are the following: Liore Olivier hydro-monoplane; Barling NB-3 monoplane, Camel, Nieuport, RSV monoplane, RSV biplane, Air Cub, Air-Istocrat, Eastman, Fleet, Klemm-Daimler, American Eagle, Eaglerock, Great Lakes, Savoia Marchetti, Stearman, Flying Dutchman, Travel Air, Moth, Arrow Sport, Great Lakes, Waco, and New Standard.

THE NEW MISSISSIPPI AIRPORT-AT-LARGE TO THE MIDDLE WEST



IN the land of the great river where the steamboat once was king, the whirr of motors and the flash of wings mark the beginning of a new era.

What a country for a Commuter—the amphibian plane for sports-loving men and women! With it, all the splendid airports of the Middle West are open to you. With it, the "father of waters" offers you a thousand miles of airway and airport, a broad expanse of water for your comings and goings, your landings and take-offs.

Wherever you go in a Commuter, you fly secure in the knowledge that here is one craft which you can convert from a land plane to a sea plane, or vice versa, *in five seconds*—and in full flight. Only an amphibian gives you this freedom of land, air and water. Only the Commuter gives you this instant, easy change.

The Commuter was designed by Loening for just such carefree flying. With 300 horse-power behind the propeller, you are in the air in seven to ten seconds, climbing a thousand feet a minute. Then, at 90 miles an hour, 400 miles at a hop, you and your friends can re-live the romance of steamboat days. Swing "down river" to Cairo, Memphis, Vicksburg and along the "sugar coast" to the Crescent City, home of Dixie and of Carnival. From this glorious center, explore the Bends and the Bayous, picturesque Baratavia and the Acadian Teche, or skirt the gulf to Biloxi and its gay beach life.

With three companions in the comfortable cabin of the Commuter there is plenty of room fore and aft for fishing tackle, guns, camping outfit, and what not. If you are tempted to swim or fish, glide to the surface and anchor your plane as you would a boat. Or if you find a shelving beach, lower the wheels and taxi right up on dry land for a picnic lunch.

To the land of the great river has come a new king—the amphibian Commuter.

PRICE
$16,800

KEYSTONE-LOENING AMPHIBIAN COMMUTER

U. S. DEPARTMENT OF COMMERCE APPROVED TYPE CERTIFICATE NO. 219

THE COMMUTER WILL BE ON
DISPLAY *at the* INTERNATIONAL
AIRCRAFT EXPOSITION,
ST. LOUIS, FEBRUARY 15—23

KEYSTONE AIRCRAFT CORPORATION
Division of CURTISS-WRIGHT CORPORATION
SALES OFFICES: 27 WEST 57TH STREET, NEW YORK

Left, a class at Parks Air College receiving instruction in aerial navigation; right, students in the shop gaining practical experience in rigging.

SYSTEMATIC GROUND TRAINING

By Oliver L. Parks
Vice President and General Manager of Parks Air College

IN the past, the ground knowledge given a flying student in a commercial school was shamefully insufficient, with the result that the student often met disaster in his later flying career. Irregular methods of instruction, an absence of scheduled lecture subjects and the lack of specialized ground school instructors were just a few of the deplorable conditions present in the early flying school. Ground lectures were given by the flying instructor, usually on a rainy day, for that was the only time available which would not interfere with his valuable time in the air. It is amusing now to picture the early lecture class, students sitting on boxes or oil tins with the instructor droning out a disjointed explanation of a random subject that had popped into his head at the last moment.

It is a different story today with the picture before us of an up-to-the-minute aviation school with its comfortable and well-equipped classrooms. A predetermined schedule of lectures is followed, a definite time being assigned for each subject. There are uniformed ground school instructors who devote their entire time to lecture work. Text books are furnished for each subject, and the lectures are further clarified by the use of blackboard illustrations drawn by the instructor during the course of the class period.

Even now, in view of these improved conditions, every flying school executive should be constantly striving to improve his ground school division. It is not difficult to vision the future aviation school as resembling closely the modern American college or university. Young men and women will choose an aviation college in much the same manner as they now select a university. When this time comes, it will be up to the air college to offer the student a well-rounded course of instruction in the classroom as well as in the air.

If the personal reference may be overlooked, I shall describe the ground school methods used at Parks Air College as an example of modern school practice, and I sincerely hope that our routine may be used for the further advancement of flying school ground training standards.

Oliver L. Parks

In the first place, every flying student in our school is required to take the Transport Pilot's Ground Course, which covers a period of nine weeks. Seven weeks are spent in the classrooms and the final two weeks in the shops and repair departments for practical application of the classroom studies. Thus every graduate leaves the school with the same identical transport pilot's ground training whether he be a private, limited commercial or transport flier.

The pilot's ground course consists of three divisions—the departments of airplanes and engines and the department of navigation, meteorology and air law. In following the theory of specialization in instruction, Lieut. J. F. Fisher, chief of ground school instruction, and Ensign N. O. Anderson, both former Naval fliers of long experience, are charged with the responsibility of devoting their entire time to the ground training of student pilots. Outside of class hours the instructors devote their spare hours to research work and the development of new theories in ground instruction. Any students wishing to go into conference with an instructor will find him available at any time which is not within the class schedule. This feature is invaluable for students who need occasional advice or those having problems to be brought up after class hours.

Of prime importance in the ground school system is the assignment of a specified lecture subject for each of the seven weeks time. For example, in the engine department, the first week's work may cover the subject of carburetion; the second week, ignition; third week, principles and materials of engine construction, etc. By following this carefully laid out schedule, the student is led through a definite and predetermined channel of instruction and the courses are so conveniently planned that he may enter school at the beginning of any week and without delay obtain a full cycle of lectures within the scheduled seven weeks.

New ground school classes are started on Monday of each week, and each student is required to spend three hours a day in the classroom. Both morning and afternoon lectures are given in order to meet the requirements of the flying schedule. Students flying in the morning attend the afternoon ground school from two till five, and the afternoon flying students attend class from nine till twelve each morning. Lectures are given the first four days during the week, Friday being devoted to three-hour written examinations covering the subjects taken up throughout the week's lectures.

An efficient feature of the lecture system is the provision that any student who fails the weekly written examination is required to repeat the courses in which he was deficient. This ruling is not for disciplinary purposes but is based on the desire of the instruction staff to give the student the most thorough understanding of the various courses before he is permitted to attempt his Government license examination.

Upon completion of his classroom work, the student spends two weeks in the repair and maintenance shops where he makes a practical application of his theoretical study. He is in the shops from 8:30 a. m. to 5:00 p. m. every day and is constantly under the supervision of a licensed mechanical in-

(*Continued on next page*)

GETTING THEM OFF THE GROUND AND UP!

FOUR times Wright's big tri-motor soared over New York, each time laden with Presidents, Treasurers, and Sales Managers of great American companies. Less than one quarter of them had ever flown before. But all were eager to learn for themselves how planes are used in business.

Now, they know the comfort of flying. They know its ease, they could not help being impressed with its speed and its dispatch. In short they know the part in business transportation that the airplane is taking in the life of 1930.

Never mind how many planes were ordered, never mind how many Wright motors were sold, the important part was and is, that fifty big men were brought to flying.

As soon as the business side of aviation is proven practically to forward looking men . . . as soon as aviation's great advantages are experienced in the person, even pre-conceived ideas of its commercial value are raised.

The lesson is simple and not spectacular. The bigger the men who go up . . . the broader their views and the keener their business sense . . . the more readily they accept the advantage that Aviation gives. The better the candidates for the First Flight Club the more far reaching the result!

WRIGHT

AERONAUTICAL CORPORATION

PATERSON, NEW JERSEY

(Continued from preceding page)

structor. His first week is spent in the airplane department where he becomes familiar with servicing and repair of planes that are in actual flying service. He is given a thorough training in rigging, being required to participate in the dismantling and complete assembly of actual airplanes.

The second week in the shops is spent in the engine department where the student receives a thorough training in the repair and maintenance of more than five types of airplane engines. His experience in this department includes disassembly, complete assembly, overhaul and repair of the various power plants.

After the student completes his ground school, he continues with his flight training which, of course, he has been taking in conjunction with his classroom work. The student is granted the privilege of "sitting in" on any lectures while taking his final

(Continued on page 116)

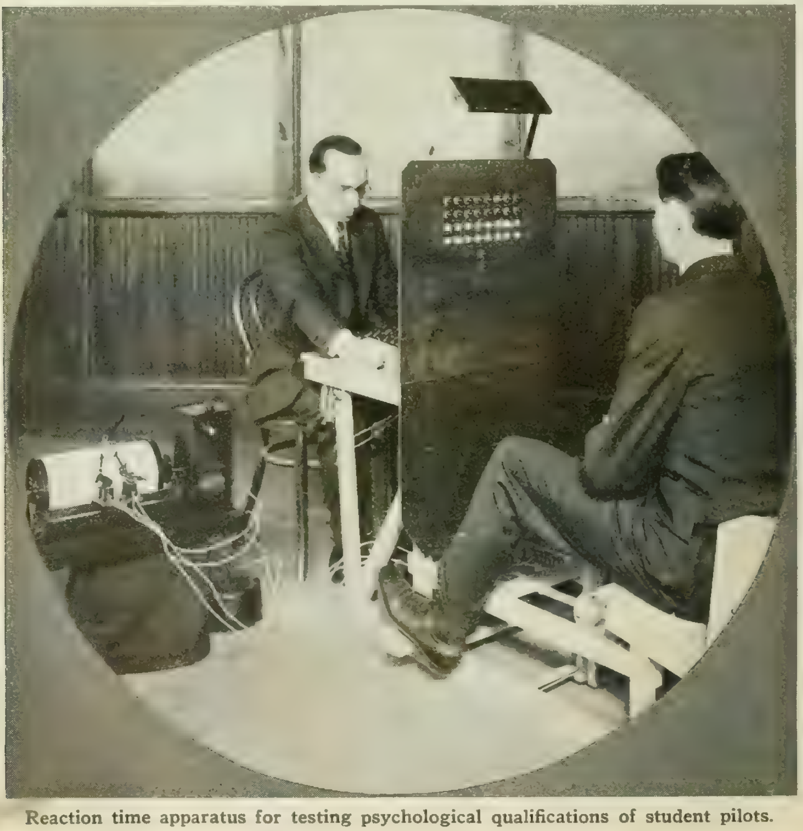
TESTING PSYCHOLOGICAL REACTION TIME OF FUTURE PILOTS

By S. R. Winters

A MECHANICAL and electrical "psychology teacher" has been evolved for testing the mental qualities of prospective pilots. As a complement to such training devices as the Ruggles Orientator, the Reid apparatus of England, and the "flight tutor" of the Army—in which physical fitness is the primary test—this new testing outfit tacitly but frankly asks the student of aeronautics, "Are you mentally competent to pilot an airplane, even admitting your physical ability?"

Paralleling the method of selecting employees for the United States postal service—railway mail clerks, postoffice clerks, etc.—Dr. J. J. O'Rourke of the United States Civil Service Commission conceived the idea of having a mechanical and electrical device administer psychology tests to would-be fliers. His idea was translated into a mechanical and electrical unit by Dr. W. G. Bromacher, chief of the Aeronautic Instruments Section of the Bureau of Standards, and his staff of assistants. With the completion of the instrument, it was introduced to service by the Army Air Corps at the School of Aviation Medicine, Brooks Field, Texas. It now serves the special function of a correlation device—that is, the results of psychology tests as determined by this machine are compared with the results of his school grading, and if the two coincide, the apparatus may be accepted as an infallible index to the mental fitness of prospective pilots.

This psychology teacher—a mechanical and electrical genius unversed in books but none the less unerring in judgment in determining the mental competence of students of aeronautics—not only gives its own course of instruction, but grades the student and scores his examination papers at the same time. This is accomplished by a machine known as the kymograph.



Reaction time apparatus for testing psychological qualifications of student pilots.

On a moving drum is written the fate of the aspiring aviator, the recording unit being connected by intricate wires with the test machine proper. The equipment proper, though not resembling an airplane in appearance, is intended to duplicate the main control units governing flight. For example, there are a control stick and a rudder bar. Seated in front of a board on which appear four rows of eight lights each—two rows green, two rows white—the pilot-in-the-making is told to place his feet on the board simulating the rudder bar of an airplane, meanwhile holding the stick corresponding to the control stick on a plane. At a small table behind the test board, the operator giving the test has a keyboard at his command, and a mirror is positioned at a convenient angle over the board to facilitate his seeing the lights.

The prospective pilot is told, previous to the actual test, that the operator will cause a green light to shine, and the student is required to move the control stick or the rudder, whichever it may be, so as to illuminate a white light under the green light which is burning. One row of lights is governed by the rudder bar and the other by the control stick. Two isolated green lights are placed under the two regular rows of lights, and should the operator illuminate these, the student being subjected to test is instructed to cause all of the white lights to burn at the same time. A clock in the recording unit registers the time the light is flashed by the operator and the period required for the student to complete the lighting of the white light.

When this mechanical and electrical "psychology teacher" was subjected to preliminary trials at the Bureau of Standards, where it was constructed, the excellent flying records of two experienced aviators were vindicated, whereas two novice pilots made low scores in their reaction to the tests—thus, pointing to the value of this instrument as a gauge to the power of concentration and mental qualities of a student.

As previously stated, the device has been adopted by the Army Air Corps at the School of Aviation Medicine, Brooks Field, as a sort of "dean of teachers" for consultation when students fail in the conventional aviation courses.

George Wies, pilot, and Jack Peace, engineer, seen beside Pioneer Instrument Co's. service ship used throughout U.S.—Stromberg-Carlson equipped.

Heralding this New Era of *Safety* in Flying....

SALES and service to the far ends of the country, have won for this ship, the sobriquet, "Flying Showcase." Typical of this great age of *safe* air transportation, it illustrates significantly, the trustworthy qualities of Stromberg-Carlson Aircraft Receivers!

Stromberg-Carlson has accompanied Messrs. Wies and Peace on all of their recent sky journeys. It has given them dependable guidance through wind and fog, rain and snow. Developed in the very beginning of aircraft beacons, the Stromberg-Carlson is an accepted standard for performance and structural design.

Heat, cold, humidity, dryness—every impediment known—has failed to interrupt the operation of this instrument. All because Stromberg-Carlson Aircraft Receiver is a product of both scientific development and practical and thorough aerial tests. Its reputation as a *safety* device is now beyond question!

It will pay aircraft manufacturers, transport operators and others interested in flying, to learn the facts about Stromberg-Carlson Aircraft Receivers.

STROMBERG-CARLSON TELEPHONE MFG. CO., ROCHESTER, N. Y.

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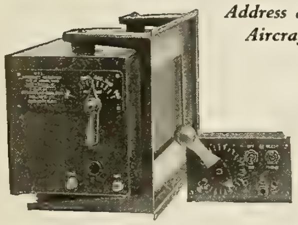

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Stromberg-Carlson is the pioneer builder of Aircraft Beacon Receivers.

Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR MORE THAN THIRTY-FIVE YEARS

WINGS OF SOUTH AMERICA

(*Continued from page* 58)

South America that with the present multi-engine planes, weather reports and capable pilots, these mountains can be crossed with perfect safety.

Weather conditions on the east coast, as well as the terrain, make it much easier to fly on the Atlantic side than on the Pacific. There are no high mountains, but instead hundreds of miles of flat country abounding with beaches, lagoons and fine harbors for either landplane or seaplane operation. On the Pacific side there are practically no good sheltered harbors between Ecuador and Valparaiso, Chile, which precludes seaplane operation except on the stretch between Guayaquil, Ecuador and Panama.

Aeropostale is operating between Buenos Aires and Natal on a day and night service, and has announced that in the spring of this year large flying boats will be put in service between Cape Verde Islands and Natal in place of the fast cruisers which have been filling in on this 1,500-mile water jump, and this will result in a saving of three days over the present time to Europe.

The NYRBA Line has agreed under its contracts with the Argentine and Uruguayan governments that within two years it will install night flying and cut down the time from Buenos Aires to New York to five days. These reductions will mean that Europe, Africa and the United States will be brought as close to Buenos Aires and Santiago as New York now is to Seattle by train time. This will be of the greatest importance in business relations, for the result in speeding up communications will result in a turn over approximately four times as fast as that possible at present.

Far off Chile, although starting later than the other countires in transport aviation, has now assumed leadership in South America. Here they have installed a transport line reaching from Arica in the north to Puerto Montt in the south, a distance of 1,700 miles. Along the entire route is installed a splendid system of airports, completely equipped and inter-connected by radio. The entire personnel involved in the operation, including pilots and mechanics, are Chilean. Colonel Arturo Meron, Director of Civil Aviation and chief of the army flying corps, is one of the outstanding figures of South American aviation, possessing exceptional ability and vision. He has succeeded in putting Chilean national aviation on a basis which entitles it to rank with the world leaders. Chile possesses more than 150 pilots, in the past two years has bought forty-six American planes, and has a total of over 200 machines.

The trip into Bolivia from Arica was exceedingly interesting. At La Paz is an excellent government airport with runways 4,500 feet in length. Plenty of room is needed because the landing field is 13,500 feet above sea level, and in this thin air, planes land very fast. It is most uncanny to think that there at an altitude equivalent to the crest of the Rocky Mountains, the Bolivians are going calmly about air development and doing great things. The Lloyd Aero Boliviana line, backed by government subsidies, maintains an excellent commercial service reaching to the distant points of the republic and its connection at Yacuiba with the NYRBA Line gives an air outlet for Bolivian mail destined to the east coast of South America, the United States and Europe. Colonel Bilbao, the able young chief of the air corps, is pushing along a rapid expansion of the military aviation. I got a great kick from seeing flying instructions proceeding nonchalantly, beginning at an altitude much higher than most fliers attempt until after many hours experience.

In the Argentine, civil aviation is now spreading, and the next two years will see great progress. Private aviation is being augmented there through the medium of local aero clubs with government assistance. The airports at many points are operated by the aero clubs. Established fields are available at all the principal cities of the republic.

The Argentine is probably the world's ideal spot for aviation; there are extensive stretches of country which delight a pilot's eye, for he can see a good landing field every time he looks toward the ground. Furthermore, there is a very wealthy class of people with a sporting flair who will furnish a splendid market for privately owned planes. In Buenos Aires, Salvador, Bavastro, the capable Director of Civil Aeronautics is locating an airport that for convenience of access is not equalled anywhere in the world. The site is reclaimed government land on the water front five minutes from the heart of the business district, and here will be established a modern airport complete with every facility for both land and seaplane operation. There are at present on the outskirts three excellent fields—the military at Palomar, the commercial at Moron, and the Aeropostale field.

In Brazil at Sao Paulo the pioneer American airman of the east coast, Orton Hoover, has been in charge of aviation for the state police for eight years and has done a great deal in furthering aviation in this section. At Rio, the army has a splendid airport, twenty miles distant from the harbor, and there is a small commercial field close to the city. Rio harbor, moreover, offers magnificent facilities for seaplanes and trimotored Junkers which are being used by the Condor Syndicate on its route down to Porto Alegre. The only other established airports in Brazil are the chain stretching from Natal to Pelotas, owned by the Aeropostale. Brazil is, however, just awakening to the possibilities of air transport to cover its huge territory which is greater in size than the United States. NYRBA company has formed a local Brazilian corporation with which are affiliated some of the most prominent citizens, and we expect to inaugurate on a large scale the development of aviation in all its phases.

After flying 16,000 miles in and around South America, I am convinced that American air transport interests are now awake to the possibilities existing there—possibilities which had been realized by the French and Germans previously. Moreover, I am convinced that they will do their share in developing this rich field for American business but that American airplane manufacturers, with the exception of a few like Curtiss, Fairchild, Consolidated and Vought, have neglected the best field now available for their products. It behooves them immediately to start a selling campaign to interest the South Americans, and in so doing, I cannot impress too strongly the necessity of studying the field carefully, taking into account the languages, customs and manner of doing business there. The most important fact for American business interests to remember in entering this field (and this applies to all classes, not alone aviation), is that these countries are older than ourselves, that they have great cities with a high order of culture and that up to the present our ignorance of these facts has been the main drawback in our competition with the European nations, which have been thoroughly cognizant of these important features. American companies such as the National City Bank, International Telephone and Telegraph, Standard Oil of New Jersey, and American Foreign Power and Light have done a great missionary work in establishing American business in these fields and building up good-will, and others can well profit by this splendid leadership.

INTERNATIONAL AIRCRAFT EXPOSITION

The BIGGEST SHOW of the AERONAUTICAL INDUSTRY

AVIATION'S major gathering of 1930—the only "Class A Show" of the year sponsored by the Aeronautical Chamber of Commerce—now invites your presence! Here in St. Louis, in the world's largest exposition building, all of Aviation's physical achievements will be displayed . . . . All the leaders of the industry, all their contributions to its progress, all the new ideas and trends of the immediate future, will be here. And, even more important, there will be here developed practical plans for Aviation's next forward step—its sound Merchandising. Air-minded St. Louis—central, accessible, hospitable—offers all the unlimited facilities for your entertainment.

The Industrial Club of St. Louis

For details write St. Louis Offices, Aeronautical Chamber of Commerce of America, Suite 242-Hotel Jefferson, St. Louis, Mo.

THE FUTURE OF THE AIRSHIP

(*Continued from page* 63)

Looking back a few years and reviewing the amazing feats of aviation, Mr. Litchfield said he was impressed more than ever with the fact that the world is daily becoming smaller.

"Lindbergh was the first to make it so," said Mr. Litchfield, "by shortening the more than 3,600 miles between New York and Paris to thirty-three hours and twenty-nine minutes. Just a little later Clarence Chamberlin and Charles Levine covered the 3,900 miles between New York and Elselben, Germany, in forty-two hours and thirty-one minutes. Other spectacular flights followed, and a few months later Dr. Hugo Eckener with the *Graf Zeppelin* circumnavigated the globe in time that far outclassed any previous record of travel around the world.

"The *Graf Zeppelin,* which overshadowed all other craft as to size, now is dwarfed by the English ship, the R.100, recently completed. But when the ZRS-4, the ship our company is building for the Navy, takes the sky, all other lighter-than-air craft will be outstripped in every detail."

I interrupted Mr. Litchfield to ascertain his views regarding helium as a generally accepted improvement over hydrogen for the inflation of airships; my query was met quickly by this response:

"There is where one of the greatest differences lies between the three ships I have just mentioned. The ZRS-4 will be inflated with helium, whereas the others are flown with hydrogen.

"America has a monopoly on the use of helium non-inflammable gas. Hydrogen is inflammable. Although many aeronautical engineers are convinced that with proper precaution and operation, and perhaps the adoption of heavy oil as fuel, hydrogen can be made sufficiently safe, helium gives final protection against fire hazards.

"With its other improved characteristics, the ZRS-4 will be able to travel faster than the R.100 or the *Graf Zeppelin;* and equipped with eight engines, the total horsepower of the ship will be 4,480, against 4,200 of the R.100 and 2,650 of the *Graf.*

"The ZRS-4 will carry nearly twice as much fuel as the *Graf Zeppelin* and the R.100 combined. Sixty tons may be carried on the ZRS-4, against thirty-four tons on the *Graf* and thirty tons on the R.100.

"The structural design of the ZRS-4 may easily be adapted to a commercial ship, one to carry passengers and mail overseas. Here again the advantage of a helium-inflated ship presents itself. In previous passenger carrying rigid airships the presence of hydrogen practically demanded that the accommodations be placed outside the main hull structure.

"On the other hand, air resistance consideration necessitated keeping all protruding structures as small as possible. More or less cramped cabins were the result. Even the *Graf Zeppelin*—though it offers conveniences never before heard of in air travel—does not provide the space which the long-distance traveler desires and really requires.

"In a ship of the general dimensions of the ZRS-4, accommodations may be built in comfortably, providing for up to 100 passengers, according to the weight of fuel necessary for any certain route.

"In the case of a 100-passenger ship, the deck area would be about 12,000 square feet, of which each stateroom (for two persons) would use an average of about seventy square feet. The promenade decks and corridors would have a total length of about 900 feet and an average width of about five feet, while about 3,500 square feet would be used for public compartments.

"Promenades, lounges, dining salons and smoking rooms are not dreams, but may soon be actualities.

"Spacious compartments, the lack of noise and odors and seasickness, speed of travel over the oceans greater than is possible to any surface craft—these are some of the advantages the airship has in store for the travelers.

"The giant airship's contribution to overseas transportation will not be in competition to the surface carriers, but supplementary to them—for that proportion of passengers and merchandise to whom higher speed is essential. History teaches us that speed of travel means volume of travel. Surface lines and airlines will alike be beneficiaries as this new vehicle takes its place in the field of transport, applying in the international field what America has long learned nationally—that better communication means better understanding, has vast economic advantages, is equally impressive in the realm of human relations."

GERMAN AVIATION IN 1929

(*Continued from page* 59)

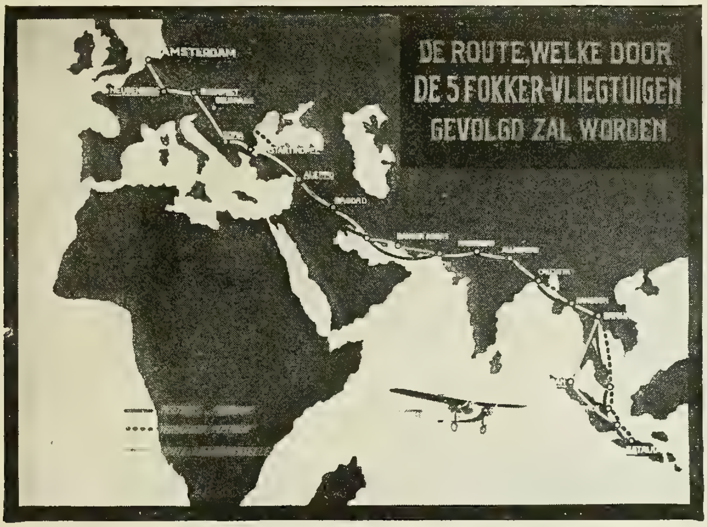
of planes or in transport business can, if necessary, be borne if there is a hope that it will be temporary. But if there are no adequate facilities provided for training those men who are to pilot the ships in better times, German aviation will be confronted with a very serious problem.

The current year also brought about another internal reorganization in German aviation. With the exception of a single French line to Northern and Western Africa, the principal source of income for aviation companies in Europe is passenger transport. In the animated discussions last spring, it had been demanded that the Luft Hansa—following the example of American aviation—develop freight and mail transport more fully. Although passengers prefer to fly during the day hours, for mail transport night-flying is indispensable. But there are only three lighted airways in Germany.

By demand of the Post Ministry, the Luft Hansa has organized a night mail service across the Baltic, developed its night freight and mail service from Berlin to London, and inaugurated a short day service between Stuttgart and Zurich, which bridged the gap between the Luft Hansa service to Southern France and Spain and the night train from Berlin. In coöperation with the Post Ministry, the Luft Hansa has also undertaken several experimental air mail flights—two from Berlin to Seville, Spain, with one intermediate landing, one to Constantinople without intermediate landings, and one by way of Marseilles and Seville to the Canary Islands.

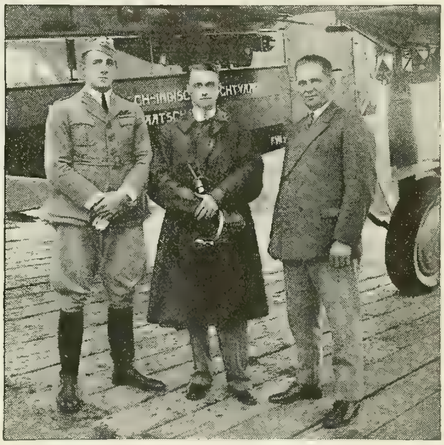
Soundly developed, the Nordbayerische Verkerhsflug A.-G. will continue in 1930, because it has been agreed that this company will take over more routes and more personnel from the Luft Hansa and will buy a number of the ships of that company. Up to the present it has used small Messerschmitt planes of the Bayrische Flugzeugwerke, but next summer will operate the larger Junkers F.13 ships bought from the Luft Hansa. The Luft Hansa will acquire a portion of the shares of the Nordbayerische Verkehrsflug A.-G.

The greatest imminent danger to German aviation has been obviated by the voting of supplementary subsidies in November. But it is still very uncertain whether the foreign loan can be secured next year, and if not, whether the central government will again be able to cover the deficit. It is, therefore, not with a very rosy outlook that German aviation enters 1930.



Map shows route of Royal Dutch Air Service Plane from Amsterdam, Holland, to Batavia, Dutch East Indies, now flown by Fokker planes equipped with Goodrich Split-Second Silvertown Tires

So much do officials of the Royal Dutch Air Services of Holland think of Goodrich Split-Second Silvertown Tires that they intend to stock them at division points all along entire route



Goodrich Silvertown Equipped Fokker Planes Span Two Continents in Landing Amsterdam Mail in Batavia, Dutch East Indies

THE FACT that a large percentage of American pilots, American manufacturers and American Transport companies specify Goodrich Split-Second Silvertown Tires on their planes is more or less taken for granted here in America.

But when a large European mail transport operator, whose ships span two continents in flight, decides on Goodrich Split-Second Silvertown Tire equipment on his planes and his company expresses the intention of stocking them along the entire route as a precaution to assure Goodrich quality in case of accident or mishap to the ship . . . then certain other pilots, manufacturers and transport companies in this country wonder why they are so careless about their tire equipment.

In the United States Goodrich Airplane Tires are no further from you than the nearest telephone.

The B. F. Goodrich Rubber Company, Est. 1870, Akron, Ohio. Pacific Goodrich Rubber Company, Los Angeles, Cal. In Canada: Canadian Goodrich Co., Kitchener, Ont.

Three Goodrich Silvertown Airplane Tires: Tail Wheel . . . Non-skid . . . Smooth Tread

Goodrich ***Rubber for Aviation***

AIRPORT AND AIRWAY

News of airlines, airports, and airways; radio, lighting and other auxiliary services

By

Kent Sagendorph

Further Reductions in Passenger Fares

CONFIRMING the opinion expressed in the Airport and Airway section last month to the effect that passengers would appreciate a fare reduction on the air lines, we are pleased to note that the reductions mentioned at that time were most favorably received. They proved so popular, in fact, that all airlines which offered the reduced rates found their transport planes crowded with enthusiastic passengers. In an effort to accommodate the unexpected traffic, the company officials pressed into service every available airplane on hand and sent frantic telegrams to the manufacturers for more. Instances are on record of traffic increasing 700 per cent within two weeks.

This widespread public acceptance of a doubtful policy convinced conservative boards of directors that the original suggestion had been sound. Consequently, they decided that they were ready to take the next step, for which the original fare reduction was a mere preliminary. The revision of air transport fares to correspond with railroad fares is now taking place.

With the exception of the lines in the Eastern part of the country, the whole air transport industry is preparing to operate at the same fare between scheduled stops as that of the railroads. Several lines have readjusted their rates until they approximate railroad fare, and others have made their charges the precise amount of the rail fare. Universal Air Lines issued a scrip book in denominations of $250 which entitles the holder to transportation anywhere on its hundreds of miles of airways at the regulation rail-plus-Pullman rate. Western Air Express, while not offering rail-Pullman rates to everybody, extends this privilege to all Federal officials, state officials in the eleven states transversed by its routes, and numerous county and municipal officials, at the same time refusing passes to any one not an employe. Southwest Air Fast Express has revised rates to correspond with rail-Pullman fare, and in three cases its new rates are less than rail-Pullman fare. Pickwick Lines, in California, fired a new gun in the rate war on the Los Angeles-San Francisco route by underbidding by two dollars the Western Air Express and T. A. T.-Maddux rate of $21.50. Stout Air Lines hacked the rates from Cleveland to Detroit for the third time in eighteen months, the present charge being $10, and at the same time reduced the fare from Cleveland to Chicago to $18.

These examples of the current trend in fare reduction show that the transition period in air transportation has arrived. The first period of beginnings has been passed. The second period of public acceptance has arrived. The day of small ships, few passengers, high fares and uncertain schedules has departed, and in its place we must adopt planes of much greater passenger capacity flying with extreme precision of schedule at a greatly lowered cost per passenger mile.

The air transport companies, by lowering their fares to the amount charged by the railroads, convey the idea to the public that the service they offer is ready to supplement further the railroad's service; that the airplane can provide the same dependable regularity of service and assurance of on-time arrival. The airlines are now competing with the railroads for the same class of traffic, and to be successful they must operate with the same precision and efficiency.

Colonial's Two-Way Voice Radio

PLANES of the Colonial Airways, including those of the New York-Boston and New York-Montreal routes, have recently been equipped with two-way voice communication radio sets which will operate in connection with the company's short-wave stations at Newark and Boston. The radio sets are installed in the tail of the planes behind the passenger compartment and are connected by extensions with the pilots' compartment, providing communication in both directions without the necessity of manipulating dials or adjusting the tuning. The pilots merely have to lift the transmitter and begin to talk.

Weather information is received every half hour by all ships in the air, and at the same time the pilots report their ship's altitude, the visibility and condition of the weather.

This is the first installation of a two-way voice communication system on an Eastern airline, and is noteworthy chiefly because of the provision made in its installation for future use by the passengers. In time there will be a connection from these short-wave stations to the telephone lines, enabling the passengers to transact business of an urgent nature, arrange for appointments and telephone ahead for reservations while the ship is in the air. A successful example of this kind of service is seen on the *Leviathan*, where the passengers may call any telephone number in Europe or America and receive a connection in a few moments. Colonial's communication engineer, Mr. Webster, plans to offer this same advantage to passengers on these airlines, and the new apparatus will be installed shortly.

Unique air marker at the tank farm of the Continental Oil Company, Ponca City

AIRPORT AND AIRWAY DEVELOPMENTS

Guggenheim Fund Reports 8,000 Marked Towns

MORE than 8,000 towns ranging in population from 1,000 to 10,000 have been identified from the air by proper roof markings, according to a final report just compiled by the Guggenheim Fund for the Promotion of Aeronautics. The campaign was recommended by Capt. Emory S. Land, vice president of the Fund, and was conducted by Milburn Kusterer until its completion December 31.

As a result of the Fund's efforts, 4,074 towns and cities which were not identified previously have now reported that they have proper and adequate roof markings. Nearly 2,000 other communities are completing identification signs, and another 2,000 reported that they had proper roof signs previous to the inauguration of the campaign late in 1928.

The roof-marking campaign was one of the most successful of the Fund's many aids to aerial navigation and will stand as a permanent reminder of the actual service rendered by the Fund to the pilots of the country. Every one who has ever flown cross-country knows the invaluable utility of a town name on a roof, and many are those who have flown off course because one was not available.

Huge Marker at Ponca City, Oklahoma

WHAT is believed to be one of the largest air markers in the world has been installed at the refineries of the Continental Oil Company, Ponca City, Oklahoma. The sign is painted on the tops of

(Continued on next page)

Call to mind every feature of design, construction and performance that you ever visioned as the ideal training plane. You'll find them all to perfection in the

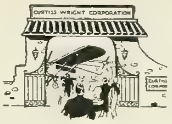
for schools..

D. H. GYPSY MOTH

Instruction's Greatest Ally—Ambition's Kindest Friend

TRIM of line, sturdy of construction, powered with the reliable Wright-Gypsy engine, tested and found true in more than 10,000,000 miles of flying under every condition and circumstance, Moth planes are ideal for quick, safe, thorough training service.

Among the outstanding features of the Moth are—aero-dynamic stability so complete that the ship practically flys itself—extreme immunity to stalls through Handley-Page slotted wings and D. H. differential ailerons—generous control surfaces, harmonized to give instant, easy and smooth response to the pilot's touch—steel-tube fuselage and wide, split-axle undercarriage to withstand the severe shocks of inexperienced landings—structural factors of safety far above strains of the most extreme acrobatic flying—telephone system to permit normal voice in conversation or instruction. The Moth possesses many other extraordinary refinements that have received the approval of famous engineers and pilots.



See D. H. Gypsy Moth in the Curtiss-Wright Exhibit at the International Aircraft Exposition, St. Louis, February 15-23.

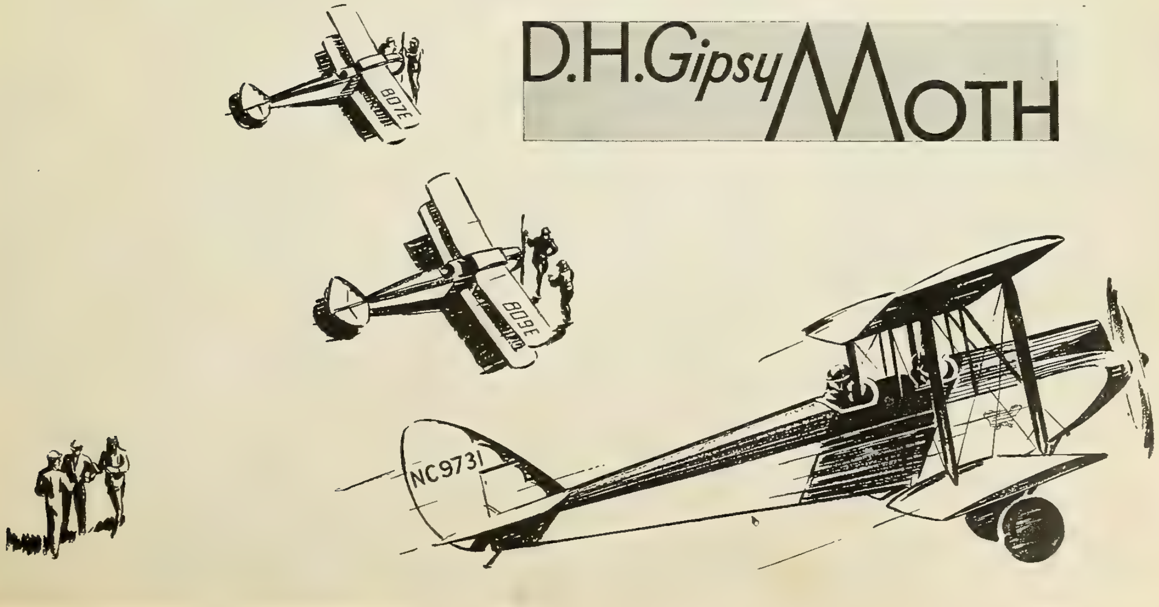
In a business era when economy is counted as profit, the Moth affords remarkably low cost of operation. The gasoline consumption approximates 18-20 miles to the gallon—about equal to that of the average automobile; oil consumption correspondingly small.

Rugged structural strength of plane and efficient simplicity of engine brings a welcome freedom from constant repairs and replacements.

These are facts. There are others that will interest you as greatly. Write today for Gypsy Moth records of achievement, statement of performance, figures of actual operating cost. Address Dept. M-70

MOTH AIRCRAFT CORPORATION
Division of CURTISS-WRIGHT
Sales Offices: 27 West 57th Street, New York

D.H.Gipsy MOTH



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a line of 80,000-barrel oil tanks located in a tank farm adjoining the refineries, and each tank carries one letter of the name. Conservative estimates place the visibility of the sign at five miles in any direction—vertical or oblique.

Geodetic Survey Compiles New List

THOSE interested in the publication of airway maps are informed that the Coast and Geodetic Survey at Washington is establishing a mailing list in order that all persons who desire to purchase copies of the new airway maps may be advised when new editions are released. No charge is made for the notification of new maps.

If you desire to be notified whenever the new maps, or new editions of present maps appear, write to the Director, U. S. Coast and Geodetic Survey, Washington, D. C., who will place your name on the list.

New Hangar for Curtiss-Steinburg Airport, St. Louis

THE first hangar at the new Curtiss-Steinburg Airport, south of East St. Louis, is nearly completed, and machinery and equipment is now being installed. Heating and lighting equipment is to be in operation by the first of February, when actual flying operations are to begin. The field is to be used by Curtiss Flying Service and by the T. A. T.-Maddux Air Lines.

Roof Marker at Holstein, Iowa

WE RECENTLY received a communication from E. A. Kuehl, Holstein, Iowa, describing Holstein as the "garden spot of the world" and a veritable flier's paradise. This is ascribed by Mr. Kuehl to the lack of mountains or other natural obstructions and to the flat nature of the terrain, which provides a succession of natural landing places. Unfortunately, says Mr. Kuehl, Holstein has no airport, because of "lack of coöperation."

There is, however, a new air marker on the public school building, with the town name in letters 19 feet high and totaling 104 in length. There is a meridian indicator sixty feet long directly adjacent. The letters are chrome yellow on a black background. Expense of installing the new marker was borne by Mr. Kuehl and John W. Scheneckloth, who jointly promoted the project.

An Airport That Pays Dividends

TO THE board of directors of Fairfax Airport, Kansas City, goes the distinction of being perhaps the first airport in the country to announce publicly the payment of dividends on all classes of stock. On March 30, 1930, the stockholders will receive twenty-five cents dividend on each share, payable to all stockholders on the books, as of March 15.

This is at the rate of seven per cent per year, and the directors announced that, although the accrued profits and undivided earnings easily justified a higher figure, conservative business policy made it unwise to announce a larger dividend. The explanation of this happy condition is that Fairfax Airport has other means of revenue besides the aviation activity carried on there. Under its broad runways lies a valuable reserve of natural gas, which has been developed by a commercial gas company into a profitable enterprise. The airport owning the land owns the gas rights as well, which to some extent accounts for the prosperous financial condition of the airport's stock.

Western Union Adds Airport Communication Stations

IN THE last seven months the Western Union Telegraph Company has installed upward of 125 telegraph stations for the use of air transport companies at various points in the United States. The company is endeavoring to cover the nation in the same fashion as that which has already been established for the railroad industry in train dispatching and other traffic business.

The usual type of apparatus for the use of the aviation industry is the so-called "Simplex" typewriter telegraph machine, by means of which an operator may typewrite a message on a special keyboard, which reproduces the message at any number of points or at a single point. It is widely used in airplane traffic operations, weather reporting service and inter-company communications. The instruments are connected at Western Union offices to the company's nation-wide network, which allows employees of the transport lines to accept messages from passengers for delivery anywhere in the United States.

Alaska Builds Fifty-Seven Airports

GOVERNOR PARKS, one of the foremost aviation enthusiasts in Alaska, announces that there are now fifty-seven airports in the territory representing an expenditure of $150,000. Because of the great distances between centers of population and settlements in the northern region, the airplane has become a vital instrument in the conduct of its affairs. Districts that have been weeks away from Fairbanks by dog sled are now brought within a few hours' flying.

The World Almanac credited Alaska with forty-four airports last year, which would indicate an increase of thirteen during the past twelve months. Flying conditions are said to be ideal during the summer, and during the long winters normal operations are carried on by means of ski equipment. All phases of activity have been benefited, even the court Judges are transported to places to settle suits and try criminal cases which have been long delayed heretofore.

Connection of the larger cities of Alaska with the United States by airplane will be the next scheme attempted by the Alaska airlines, announced the governor. The growth of aviation in the territory, now that the pioneering work has been done, is expected to be rapid.

Consolidated Leases Langley Field Site

THE Consolidated Aircraft Corporation has leased assembly quarters at Langley Field, Va., for the launching and testing of its twenty-four passenger Consolidated Commodore flying boats under construction at Buffalo for the New York, Rio and Buenos Aires Line. The company has established a rigger crew at Langley Field in preparation for the launching of the fourth Commodore plane, which has been shipped to that point for assembly and testing. The fifth flying boat will be shipped from Buffalo soon.

No more of the big boats will be assembled at Buffalo, and no further tests will be held at that city until next spring.

List of Airport Bulletins

THE following Airport Bulletins have been published recently by the Aeronautics Branch, Department of Commerce, and are now ready for distribution:

No.	*Location of Airport*
13 (Revised)	Tallulah, Louisiana
167 (Revised)	Denver, Colorado
184 (Revised)	Pittsburgh, Pennsylvania
188 (Revised)	Tacoma, Washington
191 (Revised)	Lincoln, Nebraska
258 (2nd. Revision)	Glens Falls, New York
584 (Revised)	Antelope Valley, California

802	Anderson, South Carolina
803	Mount Vernon, Ohio
804	Deming, New Mexico
805	Bedford, Indiana
806	Grand Island, Nebraska
807	Baldwin, Michigan
808	Champaign, Illinois
809	Leesburg, Florida
810	Janesville, Wisconsin

Alameda Sheriffs Prohibit Flying of Unlicensed Planes and Pilots

ALAMEDA COUNTY (Calif.) deputy sheriffs have been enlisted to enforce the state law which prohibits the flying of unlicensed planes and pilots in California. This action was taken at the request of Assemblyman Roy Bishop, chairman of the legislative aviation committee, and means for enforcing the regulations of the law have been provided.

West Virginia Airport Nearly Ready

PLANS for the new Wertz Field, Charleston, W. Va., have been completed and the construction is well under way, allowing the field to be finished and in operation by next June, according to C. H. Wetzel, an official of the operating company.

The field will have eight runways, of which one is being enlarged to accommodate the majority of traffic, owing to the prevalence of an up-river breeze which remains constant most of the year. The filed will be fenced, roads for automobiles built, runways drained and sodded, hangars and shops erected, and other facilities provided.

Lights for San Diego Airway

ACCORDING to an announcement from the Department of Commerce, a survey of the Los Angeles-San Diego airway for beacon lights is under way by L. C. Elliott, Airways Extension Superintendent.

It is planned to light the 110-mile airway before spring, it was said. Intermediate

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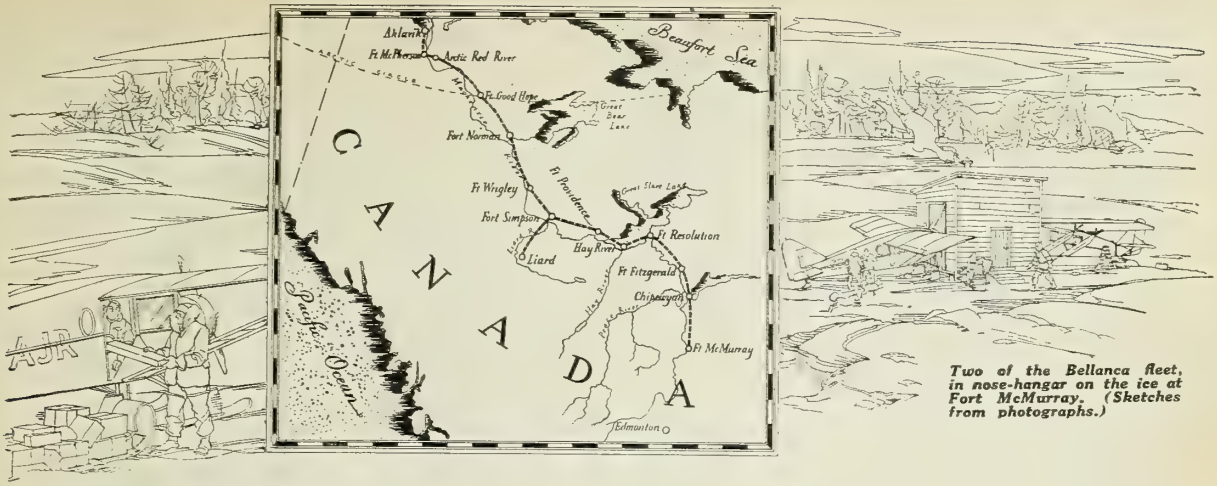


Two of the Bellanca fleet, in nose-hangar on the ice at Fort McMurray. (Sketches from photographs.)

Loading a Bellanca Pacemaker at Fort McMurray with express for the Arctic.

BELLANCA Performance in the Frozen North Again Confirms Bellanca Efficiency

Telegram received by Bellanca Aircraft of Canada, Ltd.—"Congratulate you on wonderful combination of Bellanca Pacemaker and Canadian Wright J-6 engine both of which functioned perfectly and without complaint over whole mail run from Ft. McMurray to Aklavik and return despite very severe weather conditions. W. R. Wop May, Commercial Airways, Ltd."

This airline through the Arctic wilderness has opened a new swift contact with isolated settlements—a step of progress highly significant to Canadian commerce. Passengers, mail and express are flown regularly over the 1,800-mile route with speed and safety, . . . bridging great tracts of almost impassable, heavily-wooded and mountainous country. The Commercial Airways run is one of the most arduous in the world.

Needless to add, the fleet of Bellanca Pacemakers was selected by these veteran operators after the most careful analysis of efficiency and operating economy, followed by tests of several competitive types of aircraft. Such facts as these speak for themselves!

Complete specifications and performance data of the Bellanca Pacemaker on request

BELLANCA AIRCRAFT CORPORATION
New Castle, Delaware

Bellanca Agents at the following points will be pleased to serve you in every possible way.

Baltimore Airways, Inc., 32 So. Calvert St., Baltimore, Md., or Handler Field, Baltimore, Md.
Garland Aircraft Corporation, 22nd Floor, Philtower Bldg., Tulsa, Okla.
Halley Aviation Management, Inc., 2200 Farnam St., Omaha, Nebr.
Hercules Aeroplane Products Company, 5301 Eleventh Ave., Los Angeles, Calif.
Inter-Island Airways, Ltd., Honolulu, Hawaii.
Mr. Eduardo Meade (Transportes Aeroes Transcontinentales, S. A.), Capuchinas 53, Mexico, D. F., Mexico.
Ohio Air Transport, Inc., 802 First National Bank Bldg., Youngstown, Ohio
Pal-Waukee Airport, Inc., 1116 Marquette Building, Chicago, Ill., or Des Plaines, Ill.
Pocahontas Air Transport Corporation, Bluefield, West Va.
Simmons Aircraft Division, Steel, Inc., Chamber of Commerce Bldg., Los Angeles, Cal.
Skyways, Inc., Boston Airport, East Boston, Mass.
Thurmond Aircraft Corporation, 1019 R. A. Long Bldg., Kansas City, Mo.
Wilkes-Barre Wyoming Valley Airport, Inc., Wilkes-Barre, Pa.

Canadian Distributors

Bellanca Aircraft of Canada, Ltd., 4221 St. Catherine St. West, Montreal, P. Q., Canada

BELLANCA

(Continued from preceding page)

landing fields will also be illuminated and marked. One of the six air routes of Western Air Express extends to San Diego and Agua Caliente, and in addition the line will be used by Pickwick, West Coast Air Transport, T. A. T.-Maddux and other companies.

Newark Airport Income Nearly Equals Expenses

NEWARK AIRPORT is meeting the problem which must eventually confront every municipal airport—that of the complex financing of airport activities. Although the expenses are still greater than the income, the loss has been reduced to a negligible figure when the municipal ownership is considered, and prospects for a profit-making year in 1930 appear bright.

During the first seven months of operation, the income was $19,541.49, and the expenses $23,506.57; showing a deficit of only $3,956.08, or about eight per cent of the operating cost. The income is derived from leases, tax on passenger flights, auto parking, rentals and receipts from mail companies.

Department Predicts More Airports

THE Department of Commerce hopes that before the end of 1930 there will be an airport in every 600 square miles of territory in the United States. Such a project will be aided by every facility in the Aeronautics Branch, by literature distributed to strategic centers, by speakers on aviation sent from Washington, and by coöperation from the various aeronautical organizations in the country.

During the last eighteen months $300,000,000 has been expended for airports by more than 1,000 communities, the Government report shows. It is expected that upwards of $500,000,000 will be expended in the next year and a half in airport development.

REGULATING AIR TRAVEL

New Regulations of Interest to Pilots

THE Department of Commerce has put into effect a new rule which forbids pilots with limited commercial licenses to carry persons for hire in planes which do not correspond with the provisions of their licenses, nor in any areas not mentioned in the same document. Hereafter, limited commercial pilots shall have their zone of operations as passenger carriers rigidly defined by the department, and the types of ships they may fly will be described. Instructions for the enforcement of this regulation, and others, were given by Joseph H. Marriott, chief of the aeronautical inspection service of the department, a a recent meeting at Washington.

Other changes in the regulations, however, work to the advantage of the L.C. men. They will be allowed to count twenty-five per cent of the time they actually fly passengers in company with a transport pilot, toward their time needed for a transport license. Students may count a maximum of two hours dual control time on cross-country flights toward their license qualifications and approved schools are authorized to conduct cross-country flight instruction, utilizing two pilots and dual control.

Furthermore, the department announces that there are now 775 medical examiners located throughout the United States whose duty it is to examine pilots and student pilots for license requirements. The fees for examination are fixed as follows: for transport, limited commercial and industrial pilots, $15; for the original examination of private and student pilots, $10, and the medical examination at the mid-year check for all licensed pilots, $5. These fees are payable to the examining physician and there is no charge for the issuance of the license.

Bill Would Provide College Air Training

A BILL to provide for aviation training at colleges and universities with the Reserve Officers' Training Corps will be introduced into the House of Representatives by Congressman Melvin J. Mass, of St. Paul, Minn.

The bill, he said, would provide for a four-year course. All students showing proficiency in the ground school courses would be given three months of flight instruction annually at Army Air Corps fields for Reserve officers.

Mr. Maas recently completed a 12,000-mile inspection trip of Army posts and flying fields and returned to Washington an enthusiastic supporter of the cause of aviation.

Department Spent Four Million in 1929

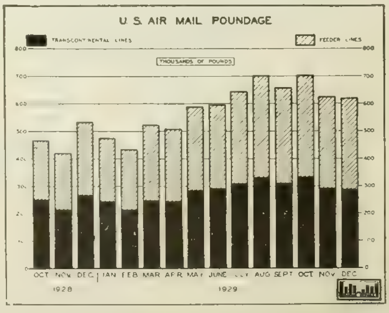
EXCERPTS from the report of the Aeronautics Branch, Department of Commerce, show that the 1929 appropriation of $4,689,550 has been expended in numerous profitable ways in aiding and fostering the growth of commercial aviation. It established aids of various kinds on 4,266 miles of airways, lighted 10,183 miles of airways and established forty-five upper air observation stations and fifty-four airways division weather stations. Twenty-seven radio communciations stations were set up and are now operating.

Tennessee Creates Aeronautics Bureau

TENNESSEE is the latest addition to the roster of states which have created aeronautics boards, bureaus, committees or other regulatory organizations. The bill creating such a body in that state was signed by Governor Horton on December 11th, and was the first bill passed by the special session of the legislature.

Under the provisions of the act, the commissioner of highways is named as the head of the division of aeronautics and is authorized to appoint an advisory board, consisting of the adjutant general and eight other members, four of whom must be experienced fliers. The duties of the board are to assist in locating and obtaining landing fields and airports.

An annual appropriation of $50,000 has been provided for the board's expenses. Violation of any of the rules issued by the bureau is to be deemed a misdemeanor and is punishable by a fine of not more than $100.



Air mail carried Oct., 1928-Dec., 1929.

AIR MAIL NOTES

Interdepartmental Committee Discusses New Air Mail Line

THE interdepartmental Committee on Airways has recommended a direct air mail route from St. Louis to New York. Inauguration of the route is not expected to occur before the beginning of the fiscal year, July 1st.

The matter of appropriations for the new line must be decided by Congress, but many Senators and Representatives have assured the committee that all the funds for the proposed route, and other appropriations for other routes approved recently, would be provided. The St. Louis route was proposed by the chamber of commerce of St. Louis and was presented before the committee four times before it was finally approved.

Foreign Mail Route Extended

EFFECTIVE January 16th, 1930, the route from Brownsville, Texas, to Guatemala City, known as F.A.M. 8, was extended beyond the latter point to San Lorenzo, Republic of Honduras, via San Salvator and El Salvator.

Pan American Airways have the present contract. The new link allows mail from the central and western parts of the United States to go directly through to Central America instead of being routed through Miami, Fla., thus effecting a saving of two days between those sections of the United States and Panama, South America and the Central American republics.

Use of Air Mail Grows

THERE has been a gradual and consistent growth in the air mail service during the past fifteen months, according to the accompanying chart showing the trend of air mail carried within the United States during that period, which has been prepared for AERO DIGEST by the Research and Graphic Service of St. Louis, Mo., on information furnished by the Post Office Department. A few recessions in the graph are the result of bad weather conditions, according to the Post Office Department. Flying conditions during the month of December, according to the department, were the worst experienced in the history of the air mail service and account for the comparatively poor showing for that month.

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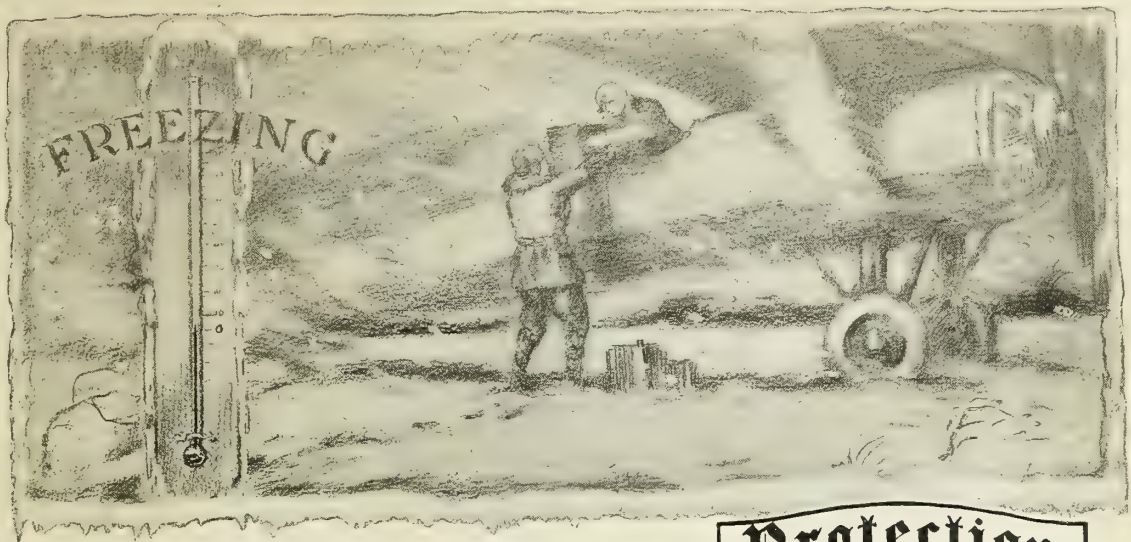

WHEN WINTRY BREEZES BLOW

THEN comes the season of chapped lips—faces roughened and cracked.

Makes you feel like putting up the old bus or making for summer climes.

On your next flight, just try

'BOROFAX'

a 10% Boric Acid ointment with a special absorbent base.

A thin film on the skin builds a shield of protection against the wind—sleet and snow.—It never becomes rancid—is obtainable through your Aviation Supply House. If you cannot secure, please inform us.

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(*Continued from preceding page*)

Request to Revise Mail Service

POSTMASTER GENERAL WALTER F. BROWN, always on the trail of his $3,000,000 deficit, believes that Congressional action in the present airmail tangle may go a long way toward reducing the loss from airmail contract rates. He asks authority to consolidate existing short routes to extend them into territory not served at the present time; to open long-haul lines which are more direct, and to revise the general airmail situation in such a way that the deficit may be reduced.

Instead of presenting his requests to Congress in a formal manner, Mr. Brown has held conferences with members of that body and outlined his plans and the extent of the authority required.

Adams Pick-Up to Go Into Production

COMMERCIAL production of the Adams Air Mail Pick-up device will begin in the near future, it has been announced by its inventor, Dr. L. S. Adams. The Truscon Steel Company of Youngstown, Ohio, has been awarded the contracts for construction.

Municipalities which do not offer air mail poundage in sufficient quantities to warrant a plane's stopping will benefit from the invention, said officials. Installation of each device costs about $3,000, whereas the annual rental will be about $1,000.

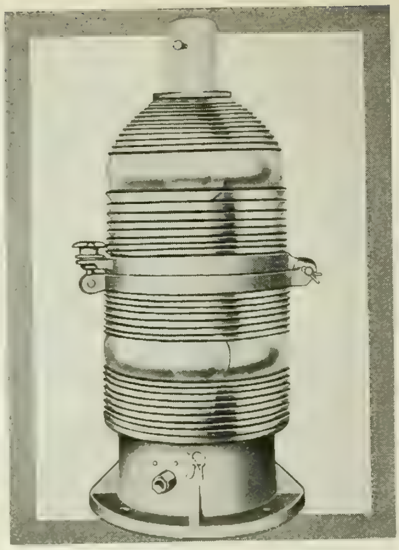
The pick-up has been demonstrated quite exhaustively for the benefit of airline officials and air mail contractors, and is said to meet the approval of all concerned. Nothing official has been said by the Post Office Department regarding its acceptance.

Mail Tubes to Airports Proposed

FIVE cities have been selected by W. Irving Glover, Second Assistant Postmaster General in charge of air mail, for the preliminary installations of pneumatic tubes for the conveyance of mail from postoffices to airports. They are New York, Boston, Chicago, Cincinnati and Los Angeles. The Post Office Department uses these tubes quite extensively in the main postoffices of the larger cities for delivery of mail to railroad terminals, steamship docks and central distributing points, and their value as time savers has been demonstrated conclusively. The only deterrent to widespread adoption in air mail fields has been the high cost, but it is believed that the Post Office Department will find funds for several installations during 1930.

N.A.T. Did Big 1929 Business

PLANES and pilots on the lines of the National Air Transport on routes between New York, Cleveland, Toledo, Chicago, Kansas City and Oklahoma City, as well as points in Texas, flew a total of 2,646,966 miles during 1929, of which 1,270,688 miles were at night. This is an increase of 400,000 miles over the 1928 total. In pursuit of this record the planes carried 2,027,959 pounds of mail and 75,607 pounds of express. This is 900,000 pounds of cargo more than the 1928 record.



Pyle-National electric code beacon

Officials of the line credit the increased regularity of the service to the application of radio as a means of combating bad weather. All planes were equipped with sets during the year, and in many cases this protection enabled pilots to complete trips over the mountains in weather which would have forced the ships down had not radio been provided.

Colonial Western Completes Second Year

THE second year of profitable operation has been completed by Colonial Western Airlines, carriers of the air mail between Albany, Buffalo and Cleveland, without the loss of a single piece of mail or injury to a passenger. During the two-year period the line has carried a total of 152,870 pounds of mail a distance of 614,559 miles. The 1929 total was 87,808 pounds of mail; an increase of fifty per cent over 1928. A comparison of the mail loads for the first month, 530 pounds, with those of the last month, 9,420 pounds, shows an increase of 1700 per cent.

New Route from Canal Zone to Argentina

THE present service operated by Pan American-Grace Airlines from Cristobal, C.Z., to Buenos Aires will be extended to Montevideo, Uruguay, according to advices from the Post Office Department. The service will be weekly, and letters will be adorned with 55 cents in stamps, payable in advance, for each ounce or fraction thereof.

THE PASSENGER LINES

Passenger Service Discontinued by Interstate Airlines

PASSENGER service over the route of the Interstate Airlines from Chicago to Atlanta was discontinued January 4th, according to advices from Col. W. G. Schauffler, vice president and general manager of the company. The order probably signifies the company's intention of changing the present day mail line to a night line. It is thought that night flying will be inaugurated about the first of February.

Although Col. Schauffler's statement gave no further details, it is believed that this discontinuance applies only to the Chicago-Atlanta line, and that the company's feeder line from Evansville, Indiana, to St. Louis will be continued as a passenger carrier. He did not assign any explanation for the decision.

Fare Reduction Boosts S.A.F.E. Traffic

REDUCED fares on the routes of the Southwest Air Fast Express lines have been accepted so enthusiastically by the public in the Southwest that the present scale, which was adopted for a fifty-day trial, has been made permanent. The fare was reduced from ten cents to five cents per mile on January first, and since that time passenger traffic has increased 300 per cent, according to L. G. Fritz, vice president and manager of operations. Mr. Fritz recently went to Detroit to negotiate for more trimotored Fords to meet the demands of the traffic resulting from the fare cut.

In some cases, the new rates are slightly lower than the combined rail and Pullman fares; in others, the fare is approximately the same. For instance, the rail and Pullman fare from Kansas City to Tulsa is $12.65 and the new air rate is $12.50. From St. Louis to Tulsa the rail and Pullman charge is $20.55 and the air fare is $19. The most striking example of the rate reduction is that between Oklahoma City and Wichita Falls, with rail and Pullman charges of $11.30 and an air fare of $6.50. The new rates continue to offer free bus transportation to and from hotels and airports, and allow twenty-five pounds of baggage.

Larger Passenger Total in 1929

ACCORDING to estimates from the Department of Commerce and figures prepared by Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, the number of passengers carried by the airlines of the country last year is placed at 3,527,000. This figure is based on reports from twenty-seven out of forty scheduled airlines and indicates that an average of 254 passengers were carried in the air every day.

New York, Rio and Buenos Aires Line Opens South American Service

THE first regular mail, passenger and express service between Buenos Aires and Rio de Janeiro was inaugurated by the New York, Rio and Buenos Aires Line on January 15th, it was announced by Wm. P. MacCracken, Jr., chairman of the board. As the basic southern division of the company's international line, the new route completes the first division of 1,500 miles northward on a 9,000-mile air journey to link principal cities of South America on a direct line with the United States. Travel time is cut from twenty days to seven between Buenos Aires and New York.

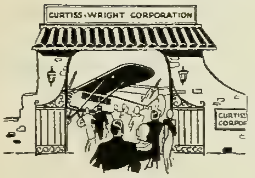
The division provides weekly service between Buenos Aires, Argentina; Montevideo,

(*Continued on next page*)

PROFITABLE LINKS *in Air Transportation*

THERE is one sure way to gain better than usual profits from air transportation. Put your business on a basis of safety, speed and comfort at low operating cost—with TRAVEL AIR Six-place Cabin Monoplanes!

Throughout America there is a need for tributary air lines, to fill in the gaps between off-main-line cities and important airports on cross-continent routes. Passengers will patronize a feeder line that takes them direct to a connecting airport without the delay of transfer from train or motor bus, and long-distance travellers like to continue their journey by air from division point to destination. Such air travel truly saves time.



See Travel Air in the Curtiss-Wright Exhibit at the International Aircraft Exposition, St. Louis February 15th to 23rd.

Passenger confidence is won and held by TRAVEL AIR. Its luxurious interior provides comfort and relaxation—riding pleasure that makes boosters and brings repeat business.

From the operator's angle, TRAVEL AIR Six-place Cabin Monoplane is an ideal ship. It is extremely versatile—in local line passenger and express service, in charter for business or pleasure trips, or as a reliable means of transportation for emergency when speed is especially important.

On every good point you can think of—handsome appearance—inherent safety—easy handling—all-weather efficiency—speed that assures low passenger-mile costs—TRAVEL AIR has demonstrated its superiority.

Write straight to headquarters for full information on TRAVEL AIR monoplanes for transport service and detailed statements of costs in actual operation. Address Dept. T-70

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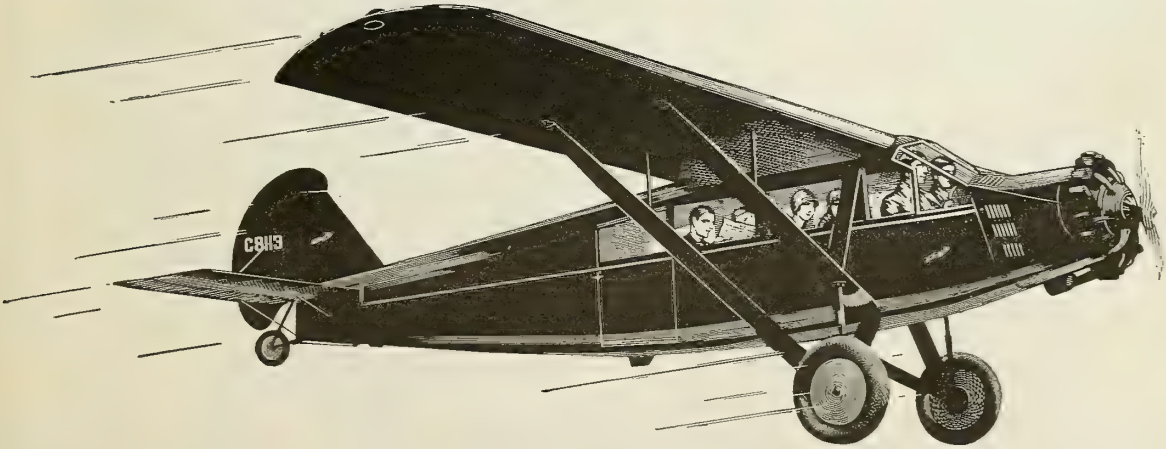

A PLANE FOR EVERY PURPOSE TRAVEL AIR

(*Continued from preceding page*)

Uruguay, Pelotas, Porto Alegre, Florianopolis, Parangua, Santos, Sao Paulo and Rio de Janeiro, Brazil. The line reaches to the heart of the commercial region of South America. Extending the company's original operating route to 3,500 miles in South America, it will provide direct mail, passenger and express service between principal cities in Argentina, Brazil, Chile, Bolivia and Uruguay on a direct route to the Brazilian capital. In replacing short rail lines and coastwise steamer service for mail, the schedules will cut travel time from seven days to three between Chile and Brazil.

Consolidated Commodore twenty-passenger flying boats will be used on the new division, principally for through service between the larger cities. They will be replaced by Sikorsky amphibions on the shorter local runs. In February, the company plans to inaugurate the first through service between Santiago, Chile; Buenos Aires, Argentina, Rio de Janeiro, Brazil and the United States.

Universal Air Lines Report Big Demand for Scrip Books

ACCORDING to V. L. Bolin, divisional traffic manager for Universal Air Lines, the demand for Universal's new scrip books far exceeds the supply and the entire quota of twenty-five for the Braniff division was sold out the first day. The scrip books retail for $250 and entitle the holder to transportation at the regular rail and Pullman rate anywhere on the Universal system. They are transferable and may be given to friends and business associates of the holder.

At the same time, word was received from the headquarters of the Universal system that the special excursion rates in effect on the company's lines were to be discontinued, effective January 15th; the experiment having been made for the holiday trade and found highly successful. In the future the holders of the scrip books will be the only class of travelers on Universal lines who may travel for less than the reguar airline fare.

W.A.E. Grants Public Officials Low Rate

SPECIAL travel rates for all Federal officials, state officials and the officers in many counties and cities were announced by James G. Wooley, vice president of Western Air Express. The new rates became effective Christmas day and are to remain in force indefinitely.

Under the present system, those officials entitled to the concession may take a trip over Western Air Express lines on official business for the same amount as railroad plus Pullman fares. Actually, the cost is somewhat less, because on the airlines meals are served free of charge.

The rates apply to all Federal employees and state employees of the following states: California, Nevada, Utah, Wyoming, Colorado, Arizona, New Mexico, Texas, Oklahoma, Kansas and Missouri. They are extended to county and city officials of places where Western Air Express has terminal or airport facilities, an exception being made in the case of San Francisco city officials because of the location of the company's terminal at Alameda, several miles from the city.

Scheduled Operations Show Big Gain

PLANES in scheduled air mail and passenger operations within the United States are now flying 84,656 miles daily, stopping at 206 communities and serving a population of 90,000,000 people, according to the American Air Transport Association's quarterly report of air transport activities. More than 20,000 miles of this total mileage is being flown at night, made possible by flashing beacons and blinker lights stretched out along 10,183 miles of lighted airways. Nearly 3,000 additional miles are in the process of being equipped with lights and radio devices.

Thirty lines are flying passengers between definite points on 178 regular daily schedules. Air mail is being carried by nineteen lines, and a score of both mail and passenger lines are being operated as express carriers in addition.

Further News of the San Francisco-Oakland Ferry Line

CONTINUING the discussion of the proposed San Francisco Bay air ferry service, mentioned in the Airport and Airway section last month, we learn that Vern Gorst, sponsor of the line, has received two Loening Air Yachts wherewith to start operations. The schedule which has been adopted calls for four trips hourly between the downtown section of San Francisco and Oakland.

The schedule allows ten minutes for the trip, and the fare is $1.50. The ferry rate is twenty-five cents, but the time required is over an hour and the crowded condition of the street car and bus service between the center of the two cities and the ferry terminals indicates a large volume of traffic for the new airline. Buses meet the planes at both ends and transport the passengers to convenient points in the downtown districts.

Vern Gorst also operates the Puget Sound ferry, and has carried so many thousands of commuting passengers in his Leonings during the two years that the line has been in operation that he ought to be well informed as to the needs of the new San Francisco service. No date has been announced for the formal opening of the new line.

NEW COMPANIES AND MERGERS

Airways Corporation of America Formed

FORMATION of the Airways Corporation of America, which plans to inaugurate a plane service between New York, Philadelphia, Washington and points on the Pacific Coast, was announced in Delaware recently. The service, which will be placed in operation soon, will be the first transcontinental airplane passenger service not operated in conjunction with railroad travel. The new concern is headed by General Amos A. Fries, war-time commander of the Chemical Warfare Service, U. S. A.

Several points in the firm's operating policy are noteworthy, not to say revolutionary. They propose to use Whittelsy Avian planes equipped with wing slots and small radio sets, and it seems they will fly over a secret transcontinental route which has not been discovered by any other air transport organization. No details are available.

Directors of the corporation include: Congressman W. F. Lineberger, J. Ballard MacDonald, H. Newton Whittelsy, Lady Mary Heath, John T. Waldhauser, J. W. Heintzman, Roy Knabenshue, George H. Perkins, Frank E. Ghiselli and William E. Furey.

C. Gilbert Peterson Now With Ford

C. GILBERT PETERSON, formerly general sales manager for the Wright Aeronautical Corporation, has joined the airplane division of the Ford Motor Company as sales engineer.

Mr. Peterson was associated with the Wright company for seven years in various engineering and executive capacities. He is an authority on the use of trimotored planes for commercial air operations, and has spent many years in research on the technical development of the airplane as a common carrier. He is credited with being the first engineer in the country to advance a workable plan for the use of trimotored planes in passenger work.

NEW DEVICES AND METHODS

New Booklet on Neon Airport Lights

RAINBOW LIGHT, INC., Long Island City, N. Y., has recently published a new booklet entitled "Rainbow Air Markers," which is the result of much research and experiment on the part of the company's aeronautics branch. The publication contains descriptions of examples of Neon installations at airports, diagrams for airport illumination by Neon lights and information as to the application of the lights to all airport problems. It constitutes a valuable aid to airport engineers and makes a good handbook.

Pyle-National Code Beacon

A NEW electric code beacon which flashes alternate dots and dashes in red or white light has been introduced by the Pyle-National Company, Chicago, Ill. The combination on the flasher can be arranged to flash any code signal desired, so that by installing a series of them at certain intervals on night airways, the pilot of a night-flying plane can identify his position instantly without recourse to a map.

The light can also be used to mark the location of bridges, power transmission towers or other obstructions by the use of a red globe inside the lens. The danger of light failure is minimized through the use of two bulbs, duplicate wiring and special corrosion-resisting aluminum alloy in the metal parts. The beacon is weather-proof and may be operated by any standard type sign flasher.

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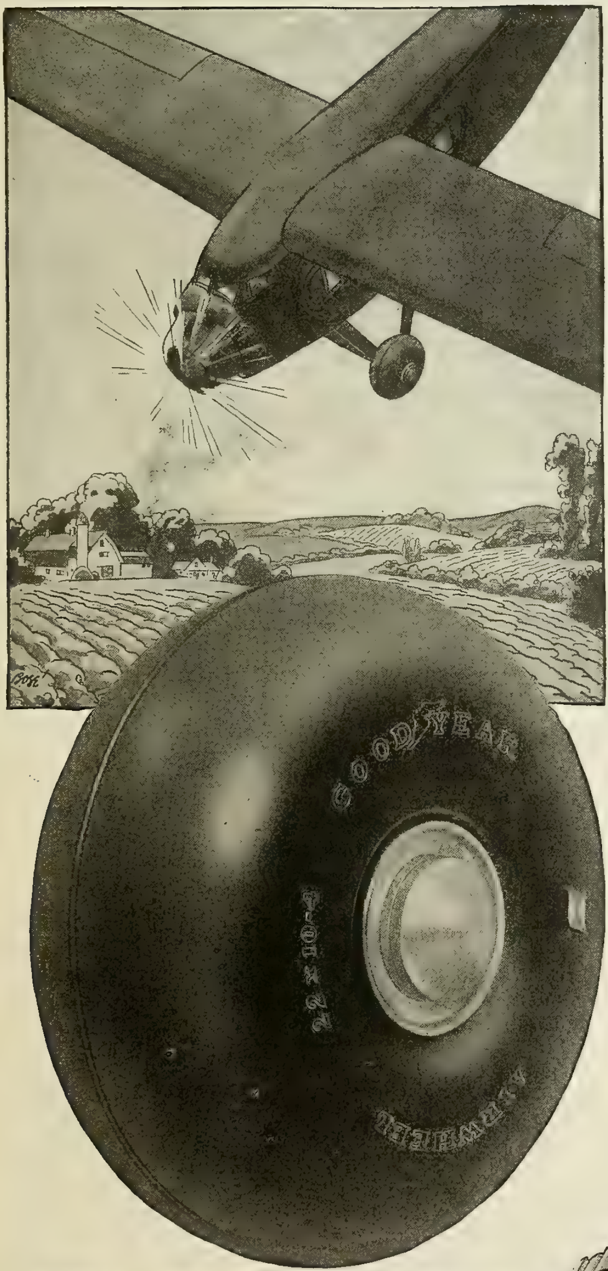
SAFE LANDINGS

where ships never dared to land before



AIRWHEELS bring new safety to forced landings. These big soft rolling rubber pillows take the place of the former wheel and tire. They operate at pressures as low as 5 pounds—up to 15. They spread out—mushroom—when they touch the ground.

Repeated landings have been made with Airwheels on plowed ground—on swamp land—on soft sand and wet fields. They land with equal ease and safety on snow.

On the normal field, tests also indicate that Airwheels can get the plane into the air in a shorter distance—and they mean quicker stops when the plane comes back to the ground. A ground loop is almost impossible with Airwheels even if you try.

Extensive tests have been made in landing with one and both Airwheels flat—and even with holes cut deliberately in their side walls—no trouble was experienced in handling the plane.

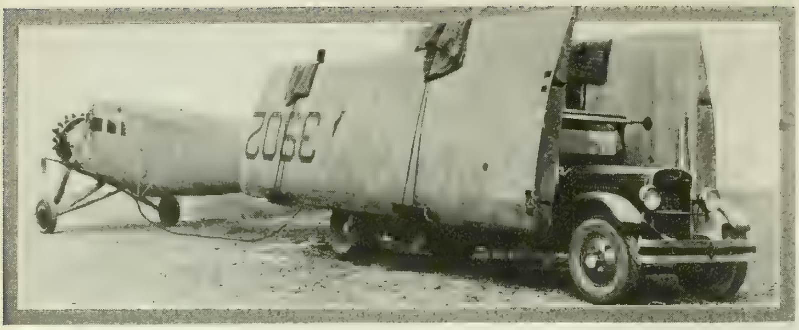
Airwheels have a streamline shape—wind tunnel tests indicate that they reduce wind resistance.

Goodyear builds the complete Airwheel, hub and brake combination. No other wheel or hub is required. The brakes, because they are self-centering, cannot lock — they release the instant pressure is released—an added factor of safety to top off all others.

Airwheels are now made for ships weighing 1000 to 20,000 pounds. For information or engineering assistance in equipping your future ships, write Aeronautics Department, Goodyear, Akron, Ohio or Los Angeles, California.

GOODYEAR

Everything in rubber for the airplane



Autocar truck with a special body for hauling dismantled airplanes

(Continued from preceding page)

An Ambulance for Airplanes

AN interesting example of a special-body truck for the loading of airplane wings and towing of its fuselage comes to us from Mr. K. N. Hyrup of San Leandro, Calif., who has equipped his Autocar truck with a special body and side brackets for the support of the plane's wings. With this truck he has established a unique business in that district in the Golden State; that of salvaging damaged airplanes and bringing them to repair stations.

This same equipment may be used by any airport which has not complete service facilities for repair of damaged planes, and desires to transport the wings and fuselage to some nearby point. It is also useful for salvage work on busy airports.

New Airport Ceiling Light

THE General Electric Company has added a new fourteen-inch ceiling light to the list of airport devices manufactured by the company. Known as the Novalux, the apparatus has an aluminum alloy case, heat-resisting glass and a graduated quadrant for setting the beam at a pre-determined angle. By using a special indicator, also manufactured by General Electric, in connection with the Novalux, the altitude of the actual ceiling can be read directly on a scale, eliminating the complex calculations heretofore required. The light is priced at $110 and the indicator $80.

MAKING PROFITS ON AN AIRPORT

By Howard V. Waldorf

CAN a municipal airport make money without burdening the aircraft operators with heavy charges? This question has confronted alike cities planning to establish flying fields and those which have already provided air terminals. If we may judge by the experience of the Oakland Municipal Airport after more than two years of operation, we can readily answer in the affirmative.

The Oakland project, established in the days when airport balance sheets were anything but encouraging and a dollar a year was the average hangar rental, is returning more than $2,000 profit to the city each month. This amount is over and above the cost of operating and maintaining the flying field. The gross revenue for the fiscal year 1929-30 is expected to exceed $80,000.

That the rates charged commercial operators are not so exorbitant as to be prohibitive is indicated by the fact that twenty-five commercial aviation firms, operating a total of more than 100 airplanes, are permanently based at the flying field—and this number is steadily increasing. Monthly operations average approximately 8,000 airplane landings, 6,000 passengers, and 1,500 student flights.

When the establishment of a municipal airport was first suggested in Oakland, the Board of Port Commissioners immediately launched a survey of the situation. George B. Hegardt, port manager, and Roscoe Jones, chairman of the board, directed the survey. This investigation revealed that, because of legal restrictions, the airport would have to pay for its own maintenance and administration—then an unheard of necessity. A harbor bond issue offered the only available money for the project, and under the law, bond money could be used for development and construction but not for maintenance and administration. Hangars and other needed facilities, and the care of the flying field, could not be paid for out of the proceeds of hangar leases alone, if the rates were to be kept within reasonable reach of the aircraft operators.

But the board decided that a new schedule of rates would have to be devised and that additional sources of revenue which could be utilized without overburdening those concerned must be found.

The sources and rates which were adopted by the board two years ago and which are still in effect are as follows:

Hangar space—Rental of hangar space furnishes thirty-five per cent of the total field revenue. The hangar rentals range from $35 monthly or $1.50 a day for 700 square feet to $75 monthly or $4 daily for over 2,500 square feet.

Leaseholds—Leaseholds furnish approximately eighteen per cent of the field revenue. One transport company pays $14,000 annually for the hangar which it occupies. This rental is based on the cost of the structure and allows for a fair return on the investment, plus depreciation allowances.

Fees for commercial aircraft operations—Ranging from $45 per month during the summer and $30 per month during the winter for two-passenger planes, to $90 monthly in the summer and $70 monthly during the winter for planes of more than six-passenger capacity, the sources provide approximately thirteen per cent of the field revenue. All planes, except those privately owned and flown only for sport, are required to pay for commercial privileges. Summer rates apply from April to November inclusive.

To protect Oakland Municipal Airport fliers from the competition of transient pilots who might bring their airplanes into the field only on week-ends and holidays, the board adopted an ordinance setting daily commercial rates for commercial transients ranging from $33 for two-passenger planes to $69.50 for over six-passenger craft.

Shop and office rental—Renting shop and office space furnishes about twelve per cent of the field revenue. The office and shop are located in the administration building and in the lean-to structures adjoining the hangars. The rate is five cents per square foot, with the exception of one lease on half a hangar, which carries with it the privilege of operating a public repair shop. The holder pays an annual rental of $5,300.

Hotel concession—Furnishing nine per cent of the field revenue the hotel lessee pays an annual rental totaling seven per cent of the construction cost of $55,000, plus ten per cent of the hotel's net receipts.

Restaurant concession—For the right to operate a restaurant the lessee pays ten per cent of the gross receipts, with a minimum guarantee of $425 per month, providing approximately seven per cent of the field revenue. The restaurant and hotel are the only exclusive concessions on the Oakland airport.

Service stations—For the right to dispense oil and gasoline, the fueling concerns pay a fee of one cent on each gallon of gasoline and five cents on each gallon of oil sold. The six major companies operating under this plan provide three per cent of the flying field revenue. The companies install their own underground tanks and equipment.

Night lighting charges—The lighting of the field and hangars furnishes two per cent of the field revenue and reimburses the field management for the amount of electricity used. The small floodlights are operated at $2 per hour or fraction thereof, the large B.B.T. light at $3 per hour or fraction thereof, and the hangars lighted at twenty-five cents an hour.

Miscellaneous rentals and charges—Locker and tool box rentals, vending machine receipts, telephone and telegraph service, and postoffice fee provide the remaining one per cent of the field revenue. Locker and tool boxes are rented at one dollar per month. Ten per cent of the tolls on outgoing messages filed at the

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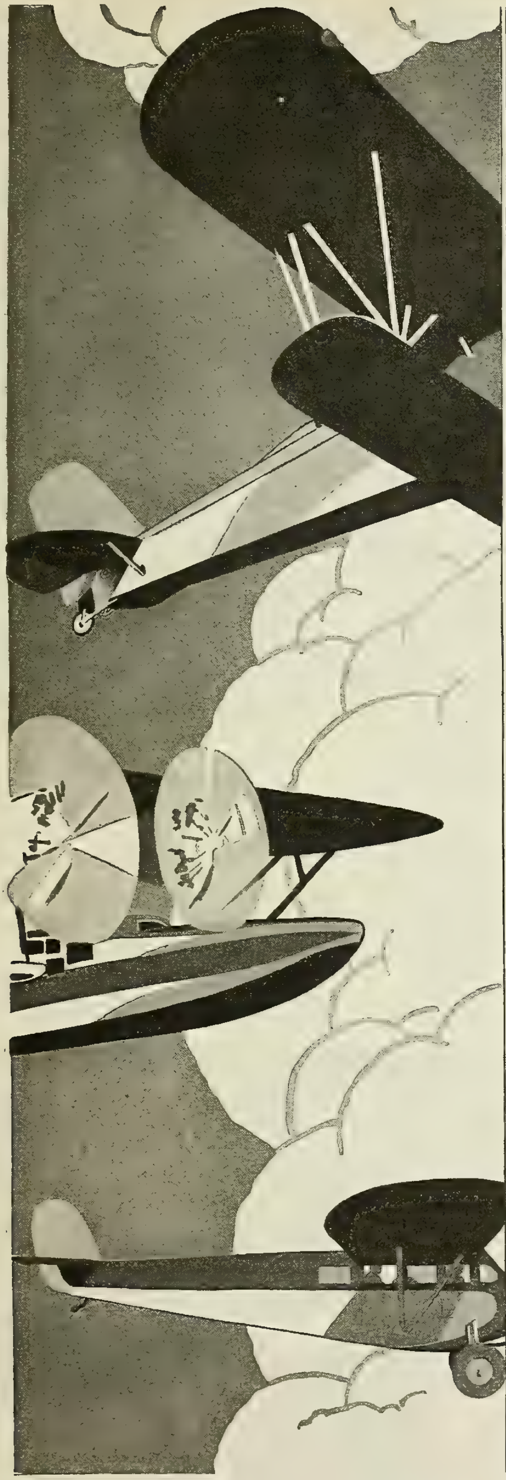

NATIONAL
SHELBY
AIRCRAFT TUBING

NATIONAL-SHELBY Aircraft Tubing conforms in every way to the same high standards of quality and accuracy of dimensions as the established line of NATIONAL-SHELBY Mechanical Tubing long used by automobile manufacturers and by makers of other high class mechanical constructions. Every foot of this product passes through an intensive system of testing and inspection. The tests for both chemical and physical properties are made to conform to U. S. Army Specifications No. 57-183 for streamline tubing, No. 57-180-1A for mild carbon seamless steel tubes, and No. 57-180-2A for chrome-molybdenum seamless steel tubes. All chrome-molybdenum tubes are made of electric furnace steel of exceptionally high quality and durability. Complete analysis and information on chemical and physical properties will be gladly furnished.

NATIONAL-SHELBY Aircraft Tubing is carried in stock by distributors located at convenient points throughout the country. These stocks are carried in specific lots so that actual test reports which accompany shipments from the mill can be furnished for each lot of material at the time of delivery.

Write for booklet "NATIONAL-SHELBY Aircraft Tubing" which furnishes, in compact, handy form, information concerning seamless steel tubing for designers and builders of various types of aircraft.

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Frick Building, Pittsburgh, Pa.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

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American Sheet and Tin Plate Company
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(*Continued from preceding page*)

airport are received from the two telegraph companies which have teletype machines in the administration building, and fifteen per cent on all local calls is received from the telephone company. The airport postoffice brings $100 per year. This amount is paid for the services of the airport employees who attend to this facility.

Other sources of revenue which may be utilized soon include the establishment of a public garage, the sale of water to the restaurant, etc., from the airport's wells, and the operation of the airport dock.

The annual payroll for the administration force of the flying field is $18,720. The staff includes a superintendent, stenographer, clerk, building and field janitors, and five service men. The total annual cost of operating tractors, graders, rollers, trucks, etc., is approximately $1,500. To this is added the sum of $6,000, which is expended annually for lighting the field and operating the field drainage pumps.

Subtracting this amount from the total field revenue gives an annual profit of more than $24,000—more than $2,000 a month.

That the value of the airport property is increasing rapidly was shown by a recent deal in which a transport company took an option on ten acres of land and agreed, if the option is exercised, to pay a rental for the leasehold on the basis of $5,000 per acre. The land was purchased two years ago for less than $1,000 per acre.

UNITED AIRPORT, BURBANK, CAL.

REPRESENTING an initial expenditure of more than $1,500,000, the United Airport, located at Burbank, on the city limits of Los Angeles, includes many modern features of air terminal construction and management. Plans are complete for making this airport, which was developed for the United Aircraft and Transport Corporation by Boeing Air Transport, one of the principal centers of aeronautical activities in that region. The port was developed as a class A-1-A airport, the highest rating for air terminals by the Department of Commerce.

Operations at the new airport were officially inaugurated on November 16 by planes of Pacific Air Transport, a Boeing System unit operating the Los Angeles-Seattle air mail, express and passenger route, which will use the new terminal as its southern base of operations.

The site for United Airport was selected after months of observation of weather conditions, wind currents and of every available location in the Los Angeles metropolitan district, and as a consequence, is well located and permits of adequate facilities. It is singularly free from fog, high winds and obstructions. Landing can safely be made at all times from all directions, both during the day and at night.

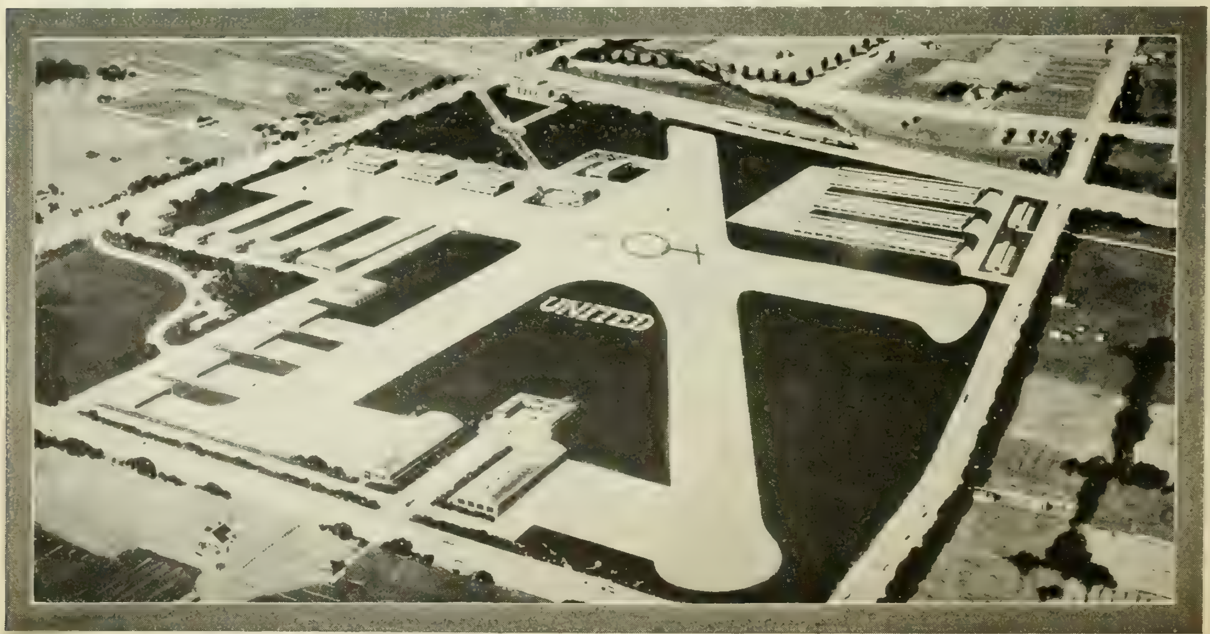
The field includes 234 acres, and has six macadamized runways, which are 300 feet in width and average 4,000 feet in length. The landing area is being developed as a dustless airport, for the field, other than the hard surfaced runway areas, will be planted with alfalfa, which not only will eliminate dust, but will also tend to minimize heat and glare. Full landscaping is provided.

The administration building, containing approximately 20,000 square feet of floor space, is of Spanish architecture. It is four stories high with a control tower and houses the administrative offices of the Boeing and other transport companies using the terminal, as well as ticket offices, passenger waiting rooms, restaurant and various concessions and offices. The pergola is furnished with tables where passengers may lunch while watching airport activities.

Installation is being made of what is said to be one of the most advanced lighting systems of any airport in the country. The contract calls for lighting the entire field, floodlighting the administration building, road-way lighting, installation of a double control system and other aids to night operations.

United Airport has been planned and is being developed as a complete aeronautical headquarters. It is a terminal for air transport lines and will be used by other companies than the Boeing organization. Acreage is set aside for airplane manufacturing plants. The Hamilton Standard Propellor Corporation is establishing a western branch plant at the new field for manufacturing, testing, experimentation and servicing. A factory is also being occupied by the Northrop Aviation Corporation for the manufacture of airplanes. Space has been reserved for flying schools, aerial taxi services, public and private hangars, show rooms, distribution headquarters and other aeronautical activities.

The terminal is conveniently located on the city limits of Los Angeles, and is thirty minutes from the city hall in the center of that metropolis. It is fifteen minutes from Hollywood and five minutes from Burbank.



Drawing of United Airport, Burbank, as it will appear when completed. This field is southern terminal for Pacific Air Transport

KEYSTONE-LOENING AMPHIBIAN "AIR YACHT"

FOUR TIMES AROUND THE WORLD

MAKING three trips a day each way between Detroit and Cleveland, the Keystone-Loening Air Yachts of the Thompson Aeronautical Corporation flew 97,191 miles in seven months of last year—equivalent to four times around the equator.

With the waterfront bases of T. A. C. but 16 minutes from the business centers of both cities, passengers leave one and are in the heart of the other . . . 100 miles distant . . . in a scant hour and a quarter. Small wonder that T. A. C. carried a full complement of passengers on a high percentage of the 972 trips made during 1929.

In the November issue of Aeronautics, Mr. Richard (Tex) Marshall, V.-P. and General Manager of T. A. C., said, "We decided to use Keystone-Loening Amphibians because we had faith in their sturdiness, their all-around ability as flying machines and because of their excellent records made in all kinds of service." This choice was amply justified by the results T. A. C. obtained from these machines in actual service.

Keystone-Loening Amphibians are making profits possible for leading air-transport lines such as Pan-American Airways, Western Air Express, Curtiss-Wright Flying Service, American Air Express and many others. Full particulars showing the distinct advantages of the Air Yacht over other types of equipment gladly furnished on request.

6 to 8 passengers : 525 H. P. : 100 M. P. H. Cruising

KEYSTONE AIRCRAFT CORPORATION

DIVISION OF
CURTISS-WRIGHT CORPORATION
SALES OFFICES: 27 WEST 57TH STREET, NEW YORK

The 1930 model Keystone-Loening Air Yacht will be on Exhibit at St. Louis, Feb. 15th-23rd

1930 Model
Air Yacht
$29,700

TENNESSEE SKY HARBOR

By O. B. Lance

ON winter nights when air mail pilots start flying down the beacon route between Chicago and Atlanta and high mountain ranges loom up in a blanket of fog as they reach the vicinity of Nashville or Chattanooga, a beam of light circling the skies from a spot down in the valley-lands twenty-three miles southeast of the city of Nashville and a few miles north of Murfreesboro will probably prove a welcome sight if the fog is too thick to continue the flight. Night flying between the Windy City and Atlanta is scheduled to start within the near future, if all the beacons can be lighted between Chattanooga and Atlanta. The lighting of the rest of the route has been completed for some time in preparation for the night air mail runs of Interstate Airlines planes, which now fly the route in daylight.

During winter months, especially, mail pilots had wearied along, fighting the fog and smoke of cities in the Tennessee mountain country, and little was done about it until early last summer. Officials of Interstate Airlines, Inc., a division of the Aviation Corporation, searched the valley-lands trying to find a new location for their air mail and passenger terminal near Nashville. Weeks were spent inspecting one site after another. One day Col. W. G. Schauffler, Jr., vice president and general manager of Interstate, in company with O. T. Ridley, now superintendent of buildings and maintenance at the company's new airport, discovered a large cotton field adjoining the Dixie Highway, seven miles north of Murfreesboro, and within a few weeks Tennessee's Sky Harbor was under construction.

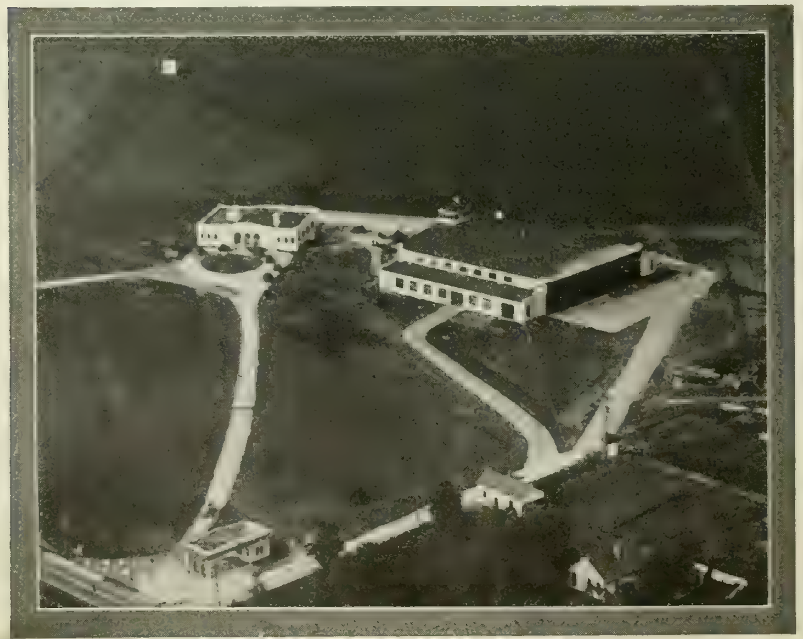
Familiarly known in Middle Tennessee and surrounding states as Sky Harbor, this Southern air terminal contains 188 acres of level land, with one of the best landing areas of any airport in the country. It was officially opened October 14, 1929, when the National Air Tour made the airport a luncheon stop in the state of Tennessee. Twenty-five thousands people gathered at Sky Harbor to see the air tour planes, and enjoy the many interesting features of the new airport.

Large floodlights and boundary lights, further aided by a beacon on top of the airport hangar, illuminate the landing field for night flying. General Electric A.L.H. floodlights are used for night landings. During the warmer months moonlight flights have proved popular at Sky Harbor.

The field is tringular in shape, with dimensions of 5,845 and 4,089 feet on two sides. Near the smallest angle of the triangle, an area of high ground is available for taking off with heavily loaded ships. Runways in three directions to the center of the landing field are 1,124 feet, 2,400 feet and 1,293 feet respectively. Tracks of the N. C. & St. L. railroad adjoin one side of the far end of the field, and a small clump of trees touches one corner several hundred yards away from the tip of the airport area near the Dixie Highway. Red obstacle lights on 65-foot poles border the northwest side of the field.

Buildings at Sky Harbor include a Spanish clubhouse with unusual features, including a spacious lounge room, roof garden for dancing and dining, sleeping rooms attractively furnished, showers, rest rooms, dining hall, lunch counter, soda fountain, ticket and telegraph offices and similar conveniences. Not far from the clubhouse is a large hangar 120 by 150 feet in dimension, with 20-feet lean-to structures for flying school classrooms, offices, mechanics quarters and shops. Provisions for airplane service have been provided not only for today's requirements, but to accommodate the large fast planes of the future. Sky Harbor is a safe, modern airport, with many desirable conveniences—close to the city of Nashville, yet far enough away to escape the fog and smoke of the metropolitan area.

Aside from its value as an air mail and passenger stop of the future on the Intertate lines, the clubhouse has become a popular gathering place for the social set of Nashville and surrounding communities. College fraternities and other organizations already have been making much use of Sky Harbor for their various functions this season.



The clubhouse and hangar at Tennessee Sky Harbor as they appear from the air

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LOAD TESTS ON ARCHED-ROOF HANGAR

DURING the recent erection of a Notrus hangar at the plant of the Great Lakes Aircraft Corporation at Cleveland, Ohio, an engineering test for wind and snow loads was requested on the structure by the Engineering Department of the City of Cleveland. Wilbur Watson & Associates, engineers of Cleveland, who designed the Goodyear Zeppelin hangar at Akron, Ohio, were employed to conduct the test.

The hangar to be tested was an arch-shaped structure, the distance across the arch being seventy-six feet and the distance around the arch ninety feet. The height of the arch was twenty-seven feet.

The hangar was constructed of standardized factory-built sectional wood units, size 6 feet by 10 feet, shaped the curve of the arch roof and bolted together. Thus, by using a certain number of these sectional units, a structure of any desired size can be built. Between each row of panels were bolted three arch ribs size two inches by 12 inches by 10 feet. The top edge of these were cut the radius of the arch.

Starting at the end of the hangar, six rows of panels and ribs were erected, the seventh row being omitted. The eighth row which served as the test span was erected, however, thus causing it to stand detached from the main structure for the test.

The scaffold shown in the illustration was erected as a matter of safety to the workmen when applying the test loads.

For the snow test the roof of the building was loaded a distance of twenty-five feet on each side of the crown of the arch with bags of sand; a total load of 19,243

(*Continued on next page*)

Fly to TORONTO *with Colonial Western Airways and really see Niagara*

In cities having waterfronts Sikorsky Amphibions can be landed so close to the business center that it is a matter of 5 or 10 minutes from desk or hotel to plane.

© Maj. Hamilton Maxwell—from U.&U.

The speedy ships of the Colonial Airways fly between Buffalo and Toronto in 45 minutes—about three times faster than other means of travel. They swing a scenic circle above the American Falls, the Bridal Veil and the Horseshoe

Until you have flown from Buffalo to Toronto with Colonial Western Airways you have never really experienced the full beauty, luxury and speed of travel. Operated with all the skill and precision that come with long months of successful scheduled flying, the line justifies the utter confidence inspired by its men . . . and its ships.

Typical of its deep concern for the comfort of its patrons is Colonial's use of Sikorsky Amphibions. With cabin interiors worthy of the finest yachts and an unusual freedom from noise and vibration, these ships put you wholly at your ease. And yet this comfort is not attained at any sacrifice of speed or performance. Sikorsky Amphibions are powered with two 420 H. P. "Wasp" engines, and fly at over two miles a minute with full load.

Further, by a touch of a conveniently located control, the pilot can convert the Sikorsky into a landplane in a matter of seconds. Here indeed is a great ship to fly and a marvelous craft in which to be a passenger!

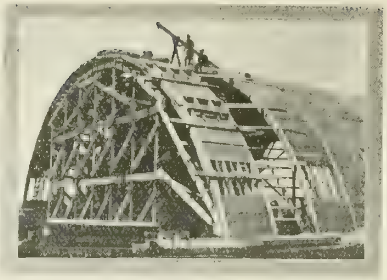
The Sikorsky Amphibion is powered with two 420 H.P. Wasp engines and has a cruising speed of 110 miles an hour at full load. Literature will be sent on request. Sikorsky Aviation Corporation, Bridgeport, Connecticut. Division of United Aircraft & Transport Corporation.

SIKORSKY AMPHIBION

(*Continued from preceding page*)

pounds was placed on the one row of panels and pair of ribs attached thereto, which was equivalent to a snow load of thirty pounds per square foot.

Steel wires with targets attached were hung from the center of the arch, also at ten-foot intervals on each side, and as the load was applied readings were taken at these points. The greatest deflection recorded was two inches and upon removal of test load the structure returned to within one-half inch of original position.



Notrus hangar during load tests

Wind load tests were conducted by attaching ⅝-inch steel cables to six by six inch timbers laid horizontally across the roof of the test arch at three equal points on one side of the structure. The steel cables ran horizontally through sheaves attached to the scaffold and then vertically toward the ground and were attached to eight by eight inch platforms, on which were piled sacks of sand exerting a windload of thirty pounds per square foot on the structure. The structure withstood this wind test which represented a ninety-mile gale and upon removal of load the structure returned to within one-half inch of its original position.

Mr. Watson in his report quotes as follows: "An inspection was made after all tests were completed for any evidence of crushing of materials at joints, splitting of members or movement of bolts and none were found. These loads meet the requirement of the building code of the City of Cleveland and, in our opinion, the deflections were not excessive for loads used."

Notrus hangars of this type are bolted together by a patented method which permits increasing the length at any time with 100 per cent salvage or moving the entire unit to a new location at low labor cost.

The exterior is covered with 85-pound slate-coated fire-resisting roofing. This slate-coated roofing may be supplanted with asbestos fire-proof roofing or Toncan Iron if appropriation permits.

SYSTEMATIC GROUND TRAINING

(*Continued from page* 94)

flight training, this privilege being especially helpful in keeping the student brushed up in preparation for the final examinations. When within just a few hours of completing his entire course, the student is required to report to his ground instructors for final examination on his ground school work. If successful in passing this examination, the student is then declared eligible to take the Department of Commerce test for a license.

The standardization and uniformity of our ground school system is evident when one considers the elements upon which it is based. A competent instruction staff wholly concerned with ground teaching, well arranged and fully equipped classrooms set aside for the sole purpose of lecture classes, a predetermined and definite schedule of lectures with each subject assigned to a specific week in the cycle, and finally the use of text books and weekly written examinations which parallel the present university and college methods of teaching.

The system that I have described has proved very successful at Parks Air College. Although not a perfection in ground school methods, this plan is, I believe, a definite step toward the ultimate standardized ground course in the aviation schools of tomorrow. The great development in this phase of flying school curriculum that is now in the making will not take place in a day. But it is certain that the more specific demands that will be made of the future commercial fliers will soon force aviation schools to adopt the standardized, efficient and scheduled methods of ground school instruction that are all important to the training of well-rounded and capable fliers.

NEW AIRLINES TO BE STARTED IN MICHIGAN

INAUGURATION of new air transport lines in Michigan will be included in the 1930 activities of the Thompson Aeronautical Corporation, according to a recent announcement by Richard C. Marshall, vice president and general manager of T.A.C. In addition to those cities now receiving air mail or passenger service, the company will extend its lines to several other cities scheduled to receive this service.

Thirteen cities in Michigan were receiving air mail and air express service at the end of 1929, this service having been inaugurated on July 17, 1928. On July 17, 1929, the Thompson company inaugurated an experimental air transport passenger service between Detroit, Kalamazoo, Bay City and other Michigan communities. The line was started at the request of a number of organizations desiring the establishment of service. The company plans to inaugurate in the spring of 1930 an additional passenger service comparable to the scope of the air mail service now operated.

The company will extend its Michigan chain of Aero Service Stations for servicing airplanes, and all air mail planes operated by the company will be equipped with radios during 1930.

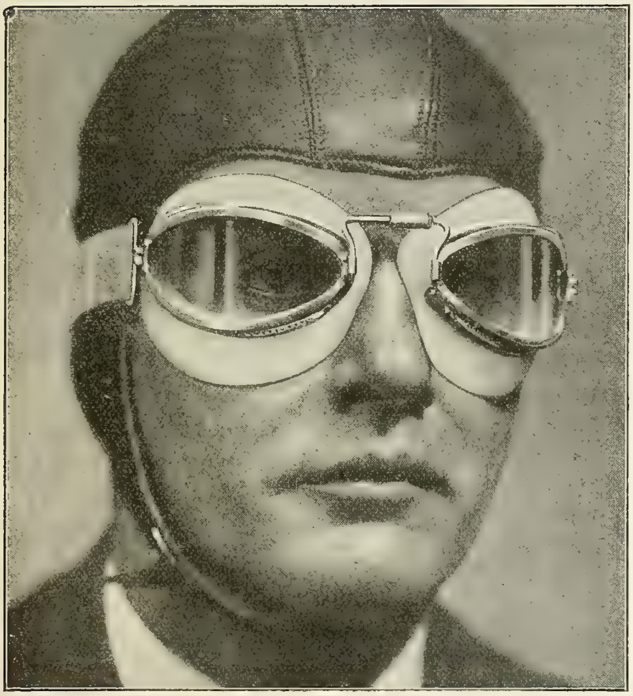
Night air mail service was inaugurated on April 1 between Bay City and Cleveland serving Saginaw, Flint, Pontiac and Detroit, Michigan and Cleveland, Ohio. On May 14, the Thompson company inaugurated an amphibion passenger, mail and express service between Detroit and Cleveland; night air mail service between Kalamazoo and Chicago was established on May 27.

Aerial view of Parks Airport, East St. Louis, showing the fleet of training planes lined up on one side of the field.

Meyrowitz presents the 1930 masterpiece of eye protection

LUXOR GOGGLES No. 8

WITH WIDE FLARING FEATHEREDGE CUSHIONS



THE research laboratories of Meyrowitz have perfected Luxor Goggles No. 8—a distinct contribution to the safety of piloting aircraft. These goggles are constructed to give the pilot a wider range of true vision, a higher degree of fit and comfort, and eliminate pressure, slippage, headaches, distortion, fogging or sweating and air leakage.

THE MAJOR FEATURES *(all covered by U. S. Patents):*

WIDE FLARING FEATHER-EDGE CUSHIONS —made of soft resilient sponge rubber . . . wide, flat and tapered, covering and protecting the more sensitive parts of the face without pressure. Feels almost as though you had no goggles on at all—no more headaches or strain; no slippage at high speed. The special nose section is a complete revelation (see inset photo below).

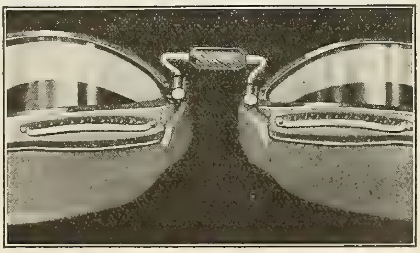
DURALUMIN FRAMES—weigh half as much; give greater strength. Durable and will not tarnish or corrode.

MICRO-ADJUSTABLE BRIDGE—with clutch type lock, quickly adjustable and maintaining perfect horizontal alignment under all conditions.

NON-FOGGING VENTILATING CIRCUIT—most perfect ventilating system for goggles. Air stream enters at bottom, is directed against lenses and exhausts at top. No air currents can touch the eye. Lenses will not fog or sweat under most trying conditions.

OPTICALLY GROUND LENSES—ground and polished to either Army or Navy specifications—cylindrical or meniscus. Wider vision with true optical focus.

See the new Luxor Goggle No. 8 at the International Aircraft Show in St. Louis. Try on a pair, see how they automatically fit your face—any face, without adjustment. Once you fly with them, you'll never be satisfied with any other goggles. Luxor Goggles are on sale at optical and sporting goods stores, flying fields and air ports. Write for special dealer proposition.



This detail photograph shows the special nose sections of the new tapered flaringsponge rubber cushions. Note the amazing fit on both sides of the nose.

E. B. Meyrowitz
INCORPORATED AND ASSOCIATED COMPANIES
520 Fifth Ave., Dept. A., New York

Send for catalogue

LUXOR GOGGLES

TECHNICAL

SAILPLANING

BY H. HARTSHELL

(PART 2)

AN AIRPLANE maneuver has been described and the dynamical inference drawn that this maneuver will result in soaring flight in a uniform horizontal wind. If this inference be correct it must fit in completely with the principles of Newtonian dynamics. The relativity of motions and forces is among the basic principles. When a dynamical prediction is not easily amenable to test by the principles of conservation of momentum and energy, or even as in the case under discussion when it appears to fulfill these principles, the principle of the relativity of forces and motions will usually afford a powerful critical test of such a dynamical prediction.

The maneuver of the sailplane has been assumed to take place in a uniform horizontal wind blowing over the surface of the earth. Will the deduction hold if the sailplane maneuver takes place in a uniformly still air with the earth moving under it in horizontal uniform motion? To get this point of view the datum of reference will be in the undisturbed air. From this datum the sailplane is maneuvering above and the earth is below in horizontal uniform motion. Will stopping the motion of the earth below affect the forces acting on the sailplane in flight above?

The air is still, the sailplane is maneuvering in the air above; if the uniform horizontal motion of the earth below can contribute energy to maintain the flight of the sailplane, the stopping (or varying) of the motion of the earth below must affect the forces acting on the sailplane.

The force of gravity is vertical in this problem. Whether or not the earth is moving under the air in which the airplane is flying, the force of gravity for all intents of this problem remains vertical and constant in magnitude. It acts between the center of mass of the airplane and the center of mass of the earth.

Reverting to the question, "How can a relative motion between the earth and the air in which the airplane is flying affect the reactions on the airplane high above in flight?", it does, nevertheless, to the extent necessary to the fulfillments of the principles of dynamics. The cessation of establishment of uniform horizontal relative motion between the air and the earth may be reflected in the forces acting on the airplane in flight.

Quoting one of America's leading scientists: "The pull of gravity must be balanced. If there is no vertical component motion in the air and no horizontal component of force on the plane which can be converted into vertical motion by slanting wings, no soaring is possible. A plane without power will eventually attain the horizontal speed of the air after which no horizontal force acts on it." These statements boil down to their lowest terms, the accepted proof that soaring in a uniform horizontal wind is impossible.

In respect to the horizontal force, the constraint imposed by the determinate flying speed depending in value upon the force of gravity acting on the airplane, fulfills every need of a horizontal force from the earth. It limits the horizontal speed of the airplane to a definite value. The constraint opposes with certainty any horizontal force (including a mass acceleration force) acting against it so that no horizontal acceleration of the airplane's mass follows the application of such a force, but instead a separation between the airplane and the earth.

This constraint is real and operates under the application of every kind of force. Under this constraint a kite will climb, an airplane equipped with a propeller with a horizontal thrust will climb, a glider, if in a brief period of horizontal motion, will climb in a gust of increasing velocity.

Recurring to the sailplane maneuvering above a datum of reference in the uniform air, with earth moving horizontally under the air, the force of gravity is acting on the sailplane in a vertical direction and with a constant value regardless of the relative speed between earth and air. Stopping the relative motion between earth and air will not alter the direction of the force of gravity. It will be recalled, upon reviewing the soaring cycle of motions, that these motions are based upon a constant gravity acting in a vertical direction. The soaring cycle then does not suppose any change in gravity accompanying change in relative motion between earth and air.

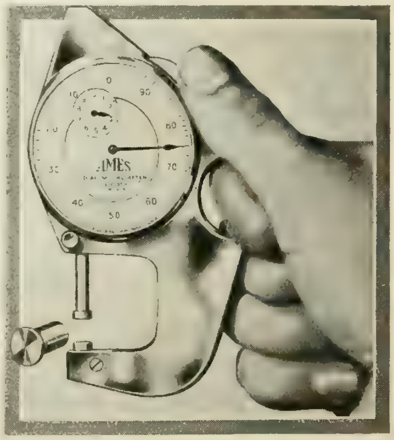
The effect, however, upon the actions and reactions of the sailplane in flight produced by the relative motion between the air in which it is flying and the earth is physical and definite. When there is a relative motion between the air in which the sailplane is flying and the earth drawing the sailplane down, the earth velocity and the air velocity of the sailplane diverge in direction. Under this condition, as has been described, it is possible to align the constraint imposed by the determinate flying speed so that it will act in the same vertical plane with the earth velocity rather than in the vertical plane with the air velocity of the center of mass of the sailplane. This makes possible a configuration of forces acting on the sailplane in flight that varies directly with the relative speed between air and earth. Where there is no relative velocity between air and earth, the air velocity and the earth velocity of the sailplane are equal in magnitude and direction. In calm, therefore, it is impossible to bring the constraint imposed by the determinate flying speed into action in a different degree on the earth velocity than on the air velocity of the sailplane.

In the recuperative stroke of the soaring cycle, the kinetic energy of the sailplane referred to the earth is greater in flight before wind than in flight against wind. With the assistance of gravity and the determinate flying speed it is possible to turn from flight before wind to flight against wind with all forces that are projected in a transverse vertical plane through the center of mass of the sailplane, perpendicular to the earth velocity of the sailplane except the force of gravity. In this turn the sailplane feels a horizontal driving force, deriving from the reduction in its earth speed. The driving force depends on the relative horizontal motion between the air in which the sailplane is flying and the earth. This driving force is real and becomes zero when the relative speed between earth air is zero.

DIAL MICROMETER

A DIAL micrometer designed as a pocket gauge for measuring and testing round, flat or odd shaped machine parts, stock, sheet metal, wire, paper, rubber and textiles, has been developed by B. C. Ames Company of Waltham, Mass. The micrometer amplifies each thousandth to an easily readable size on the dial.

The Ames micrometer is operated by lifting a quick acting spring spindle by an upward movement of the thumb, the mechanism closing the instrument into position on the work to be measured. The reading is indicated instantly on the face of the dial, and can be locked into position by means of a simple snap. The instrument will accommodate stock up to one inch.



Pocket gauge for measuring and testing

"Bigger and Better Than Ever"

No—the circus hasn't come to town—we don't want to tell you about the little lady bareback rider and all the strange and mys-ter-ious things to be seen on the IN-side.

But we had to use that old circus headline "BIGGER AND BETTER THAN EVER" to tell you about the new 1930 Curtiss Challenger engine. For nothing else so concisely describes this new edition of a famous product.

The 1930 Challenger *is* bigger. Now rated at 185 horsepower—an increase of almost 10% in power at your immediate command.

It *is* better—Smoother and quieter throughout the entire operating range, because of scientific application of principles of static and dynamic balance.

AND it retains the same old rugged reliability that kept the St. Louis Robin aloft for 420 consecutive hours to establish a World's Record and furnish a new conception of engine endurance.

Now in production and available for immediate delivery. Complete repair and maintenance facilities through nation-wide dealer organization. We'd like to tell you more about it.

CURTISS AEROPLANE & MOTOR CO., INC.

Offices: Garden City, N. Y. - - Factories: Garden City and Buffalo, N. Y.

CURTISS TANAGER

FORMAL presentation of a check for $100,000, first prize in the Daniel Guggenheim Safe Aircraft Competition, was made by the Guggenheim Fund to the Curtiss Aeroplane & Motor Company, builders of the Curtiss Tanager, at Mitchel Field, New York, January 6th.

Basically, the Tanager is a three-place cabin biplane departing from conventional design principally by the addition of three safety devices—an entirely new type of aileron, automatic wing slots and controllable wing flaps.

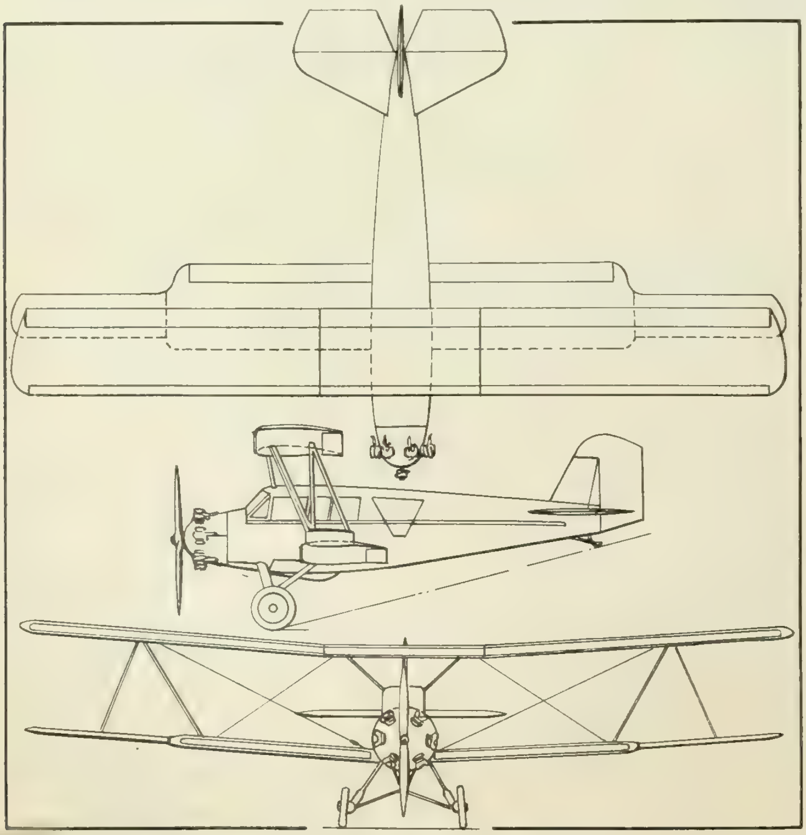
Regardless of the plane's attitude or position in the air, adequate aileron control is accomplished by the use of floating type ailerons which at all times automatically assume a position parallel to the air currents set up by the motion of the plane in flight. At the same time they may be moved relative to each other in maneuvering the plane.

The effect of these ailerons is to insure control in a stall as well as during normal flight, to reduce yawing and spinning tendencies, and to make rudder correction and control unnecessary. These ailerons are mounted at the tips of the lower wing where they operate in air undisturbed by the wings and where their operation does not disturb the lifting characteristics of the wings. A symmetrical double cambered section is used, balanced aerodynamically by placing the axis of rotation aft of the leading edge.

The ailerons float or "weather cock" directly into the wind created by the plane's motion, whether the controls are being used or not, and they remain at a neutral angle of attack regardless of the attitude of the airplane.

When the aileron control is used in the usual way, these ailerons displace with respect to themselves and not with respect to the airplane, and their action is equal and opposite; for example, if the control is moved so that a ten-degree angle is made between the two ailerons, one will be up five degrees from the relative wind and the other down five degrees, and this condition maintains whether the airplane is stalled or at high speed. The maximum possible displacement is fifteen degrees from the wind direction. The up lift and down lift are therefore equal, and the drags on each side of the airplane are also equal. When the ship is rolled, no corrective rudder is needed; in fact, the lift of these ailerons has a slight component which gives a turning tendency in the correct direction.

Because the ailerons float into the wind and follow the flight path of the ship regardless of the ship's attitude, the control is the same at the stall as it is at high speed. The Tanager can be flown in tight vertical banks and through all normal flying maneuvers entirely by ailerons and elevators without use of the rudder, and when completely stalled, the ship can be rolled from one side to the other with only slight yawing tendencies in the proper direction.



Outline drawings showing the design of the Curtiss Tanager

At high speed the tip of the lower wing fairs into the aileron section, giving clean streamlining. The mechanism which operates this aileron is as simple as a normal aileron control.

Automatic front slots and controllable rear flaps are fitted along the entire wing span. Each flap has a small aperture (open at all times) forward of its leading edge, which prevents the flap from reaching the burble point at the high angles necessary for maximum lift. The wing arrangement was developed after two years of research in the Curtiss wind tunnel, the basic wing section being the Curtiss 72 section.

Tunnel tests were made in order to secure the best lift when using automatic slots, and a new type of roller support was developed in this connection. This installation is entirely automatic and is easily adjusted so that all slots over the span open simultaneously. The slots start opening at about twelve degrees angle of attack of the airplane; they open gradually to their maximum position at sixteen degrees. There is no sudden opening, and since they are provided with buffers, there is no jar caused by their operation.

Flaps at the trailing edge of the wings are operated by a hand crank, the only added control. All other controls are normal. About ten turns of the operating crank at the pilot's right hand manipulates the flaps, and when not used, the crank can be turned back out of the way. Flap ends are provided with cloth shields which stretch out vertically when the flap is down, reducing tip vortices or air disturbances at the ends of the flaps.

Because of the landing requirements of the competition, which stipulated that a plane must come down at an angle nearer the vertical than usual, the "give" or motion of the landing gear and tail skid, which are of the oleo and rubber type, is twice as great as normal. In taxying position the wheels are "dished" in at the top, due to their large vertical travel, and during flight they are nearly vertical.

The Tanager has been landed repeatedly from a height of 200 feet by rolling the stabilizer all the way tail heavy, pulling the stick all the way back and holding this position until the landing is effected. This condition will throw many ships into a spin. When the controls are in these positions the Tanager settles in a landing attitude and lands itself with no greater shock to the ship than accompanies a normal landing. It is believed that this method of landing could be used from any height, as the ship does not gain speed but continues in a normal glide in the landing attitude. There is no tendency to fall off on either wing, nor to oscillate about any axis, and all controls are effective.

Details of the Construction

Wing beams and drag struts are of wood and are box section spars. Ribs are of wood and are normal in construction. The wing is covered with cloth, as is all of the airplane. There is a single drag truss of wood struts and steel wires. The fittings and hinges are of combined high tensile steel and dural. The interplane struts are of streamline dural tubing and streamline steel rods are used for trussing.

The cabin frame is constructed principally of wood on the experimental ship, but metal would be used in production. The cabin seats three people in tandem. The front two seats are provided with dual controls for the purposes of the competition; the space normally occupied by the third seat contained ballast during the tests. Ventilation is provided by windows all around which can be easily rolled down out of the way when desired. The seats are fitted for the wearing of parachutes. Two doors open with the hinges at the top which, it is believed, would provide a safe exit in an emergency. There is a side gasoline tank on the left of the ship, connected to a bottom tank in the same section of the fuselage. A wobble pump is available, as well as an engine fuel pump. The oil tank on the right side of the ship, and the fuel tanks, form part of the cowling.

The landing gear is of the split axle type which permits an unusually long motion of the wheel without excessive side loads and without heavy loading conditions in the fuselage. The entire landing gear is of high tensile steel and the cushioning is done by oleo and rubber devices. The load factors used are much higher than are required by the Department of Commerce. Wheels are fitted with internal expanding brakes of the usual type. The wheel track is six feet eleven inches.

The tail skid, built of high tensile steel, has an oleo and rubber shock absorbing mechanism. It is free to swivel within limited angles, but is not steerable.

Ailerons are built of Alclad ribs attached to a single beam of channel dural. Self-aligning roller bearings are used at the two attachment places for each aileron. One bearing support is at the strut point outboard, and the other bearing and aileron control mechanism are buried within the wing tip. These ailerons have free motion, which takes care of any attitude of the ship, and are subject to the pilot's control at any attitude. The ailerons can be used only for rolling the ship and there are no controls which will allow a stall either accidentally or purposely.

The horizontal stabilizer has a front beam of dural tubing and a rear beam of dural channel. The ribs are of Alclad. An unusually large stabilizer motion is provided, the complete movement being sixteen degrees. This stabilizer adjustment is entirely inside of the fuselage, and throughout the range the inner side of the stabilizer is tight against a rubbing strip at the side of the fuselage.

The vertical stabilizer or fin has both beams of steel tubing with welded steel tubing ribs. These ribs are light gauge and are small sized tubing, a relatively new development in the industry.

Elevators are built with a single high tensile steel tube beam and welded steel tubing ribs, and the rudder is of the same construction. The overall span of the elevators is twelve feet.

The fuselage skeleton is of dural and high tensile steel tubing. High tensile steel is used in the highly stressed sections where the wings and landing gear attach and the fittings at these points are all of steel. The remainder of the skeleton is of dural tubing riveted to dural fittings.

The engine is a six-cylinder staggered radial air-cooled Curtiss Challenger of 170 horsepower and is fitted with short exhaust stacks. The engine controls are of the usual type. Starting is accomplished by a hand inertia starter.

In addition to the testing equipment used by the Guggenheim Fund, the instruments provided are as follows: air speed meter, oil thermometer, oil pressure gauge, tachometer and altimeter.

A Hamilton wood propeller is used; it has a diameter of eight feet four and a half inches. The exterior finish of the ship is scarlet and black.

Characteristics

Length overall	26 feet 8 inches
Height overall	11 feet 4 inches
Span overall	43 feet 10 inches
Chord, upper and lower	60 inches
Gap	69 inches
Stagger at leading edge	29½ inches
Incidence, upper and lower	minus 2 degrees
Dihedral, upper and lower	4 degrees
Load factor	seven
Horsepower	176 at 1,800 r.p.m.
Fuel consumption, full throttle	89.3 lbs. per hour
Oil consumption, full throttle	3.4 lbs. per hour
Fuel capacity	57.5 U. S. gallons
Oil capacity	3 U. S. gallons

Areas

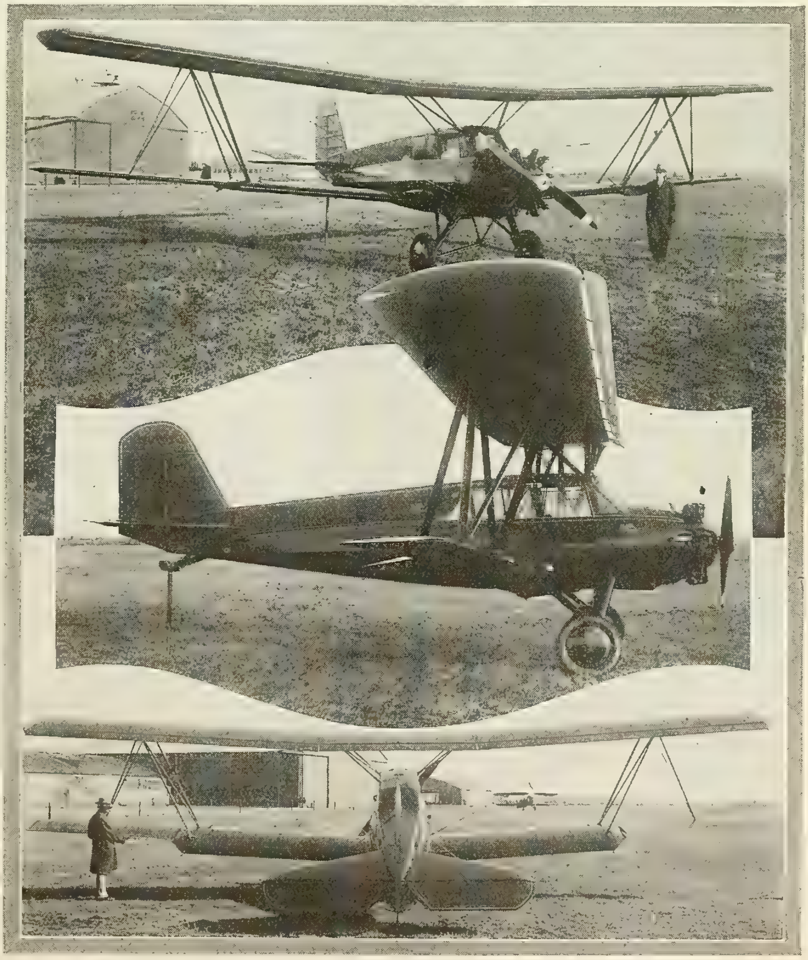
Wing, including flaps	333 square feet
Ailerons (total)	45 square feet
Horizontal tail	47.6 square feet
Vertical tail	20.4 square feet
Elevators	23.4 square feet
Rudder	14.1 square feet

Weights (for Guggenheim Competition)

Weight empty	1,959 pounds
Useful load	882 pounds
Pilot and observer	370 pounds
Fuel and oil	359 pounds
Equipment	68 pounds
Ballast	85 pounds
Gross weight	2,841 pounds
Wing loading	8.5 pounds per square foot
Power loading	16.1 pounds per horsepower

Performance

High speed	110 miles per hour
Minimum speed	35 miles per hour
Rate of climb, sea level	600 feet per minute
Endurance, full throttle	3.6 hours
Range at full throttle	405 miles
Service ceiling	12,500 feet
Absolute ceiling	15,000 feet



The prize-winning Curtiss Tanager during its tests at Mitchel Field

LAMBERT MODEL R-266 ENGINE

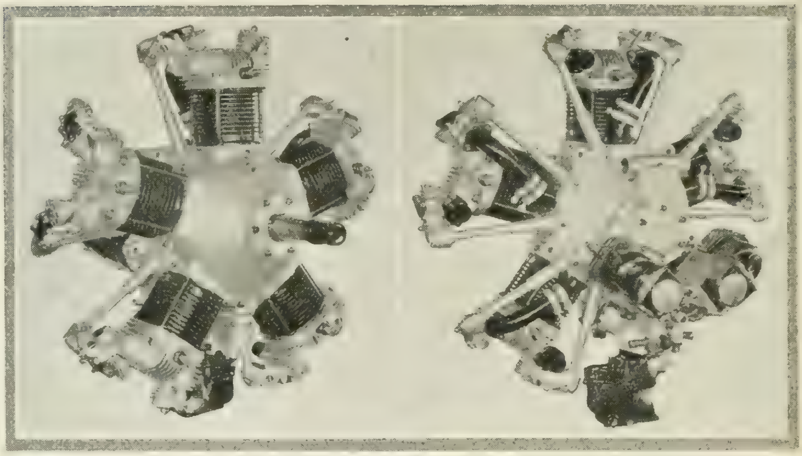
THE Lambert Aircraft Engine Corporation, a subsidiary of the Allied Aviation Industries, was successor to Velie Motors Corporation as builder of the Velie M-5, five-cylinder radial, and has now developed a more powerful model known as the Lambert R-266. The main differences between the new R-266 and the M-5 are in the crankcase and cylinder construction, the use of magnesium alloys, an increase of ⅛-inch in the bore, and the enlargement and reshaping of the inlet and exhaust passages.

The R-266 has been approved by the Department of Commerce and received a rating of 90 horsepower at 2,375 revolutions per minute.

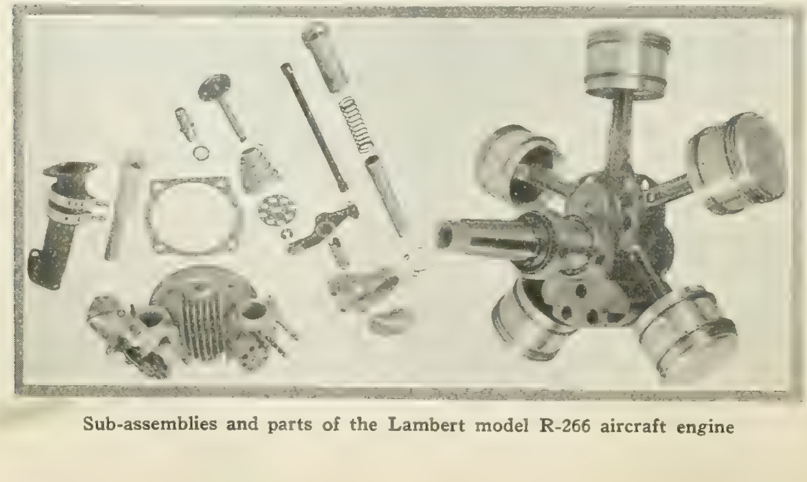
This engine is of the radial type, having five air-cooled cylinders. The bore is 4.25 inches and the stroke 3.75 inches, giving a displacement of 265.99 cubic inches. The engine possesses several noteworthy features such as small overall diameter, clean lines, ease of assembly, low operating and maintenance costs, and ruggedness combined with light weight for an engine of its power class.

The heat-treated magnesium alloy crankcase is of the two-piece type, split on the cylinder centerline. Inlet passages and valve lifter guides are cast in the rear section. The front half carries the front main bearing and the thrust bearing. The two crankcase sections are first partially machined and then securely bolted together, after which they are finish machined as one part.

The crankshaft is of the two-piece, single throw type. It is carried on three ball bearings, one on each side of the crank throw for radial load and the third near the front to take the propeller thrust as well as radial load. The bore of the crankshaft bearings is 1.9685 inches, outside diameter 3.5433 inches, and width .7874 inch.



90-horsepower Lambert 5-cylinder radial aircraft engine



Sub-assemblies and parts of the Lambert model R-266 aircraft engine

The one-piece master connecting rod is a chrome-nickel steel forging, double heat treated. The master rod bearing is 1.875 inches in diameter and 2.5 inches in length. Twenty-five operations are performed on the master rod. The crankpin bearing is of babbit, spun directly into the large hole in the big end of the rod. The wrist pins are secured by screws in flanges, integral with the big end of the master rod. Both wrist pin bearings and piston pin bearings are bronze bushed. The four articulating rods are heat-treated steel forgings, and ground and polished all over.

Pistons are of heat-treated aluminum alloy, cast in a permanent mold. Each piston has four rings. Two compression rings and one oil ring are placed above the piston pin, and the fourth (another oil ring) is placed in the skirt below the piston pin. The compression rings are ⅛-inch in width each and the oil rings 3/16-inch. The piston pins, which are of the full floating type, fit directly into the piston, the connecting rods being bronze bushed for the piston pin. Diameter of the piston pins is 15/16-inch and the piston pin bushings are 1-31/64 inches in length and 15/16-inch in diameter.

The cylinder barrel is a 1.25 per cent nickel semi-steel casting. Cylinders and cylinder heads are held securely in place by four long studs which are threaded into the crankcase and pass up along the cylinder barrel and through four holes in the cylinder head. The cylinder heads are removable from the barrels. The heads are a slip fit over the pilot on the upper end of the barrel and are held down on a shoulder below the pilot by means of the four studs passing through to the crankcase. Circular grooves on the shoulder of the cylinder barrel help to prevent the copper asbestos head gasket from blowing out.

The Lambert company has developed a method of overcoming expansion difficulties in the cylinder head. The slip fit of the head over the pilot on the upper end of the barrel eliminates severe stresses and strains occasioned by the unequal expansion of aluminum and steel. Compression is retained through the use of a gasket, as in automobile practice. The long bolts retaining the cylinder assembly have sufficient elasticity because of their length and chemical composition to take up end-wise expansion of the cylinder assembly.

The cylinder head is a heat-treated aluminum alloy casting. The valves are Thompson silcrome alloy on aluminum bronze seats. Outside diameter of both inlet and exhaust valves is 1-13/16 inches: Inlet and exhaust ports, which have a diameter of 1⅝ inches and 1½ inches respectively, are on the rear of the cylinder head, making for clean frontal lines. Seat angle of all valves is forty-five degrees, lift ½ inch, and diameter of stems 13/32-inch.

The two spark plugs are directly opposite in the front and rear of the cylinder head. Rocker arm brackets with their covers, push rods, push rod tubes and inlet tubes are all to the rear of the cylinder assembly. Grouping all these parts to the rear of the cylinder has resulted in an engine of clean appearance which can be easily cowled.

The gear case, a heat-treated magnesium alloy casting, carries the camshaft and the gear train which drives the cam, magnetos and oil pump. A single three-lobe cam actuates both inlet and exhaust valves through roller valve lifter splaced in guides cast in the rear section of the crankcase. The gear case cover, another heat-treated magnesium alloy casting, carries the magnetos and oil

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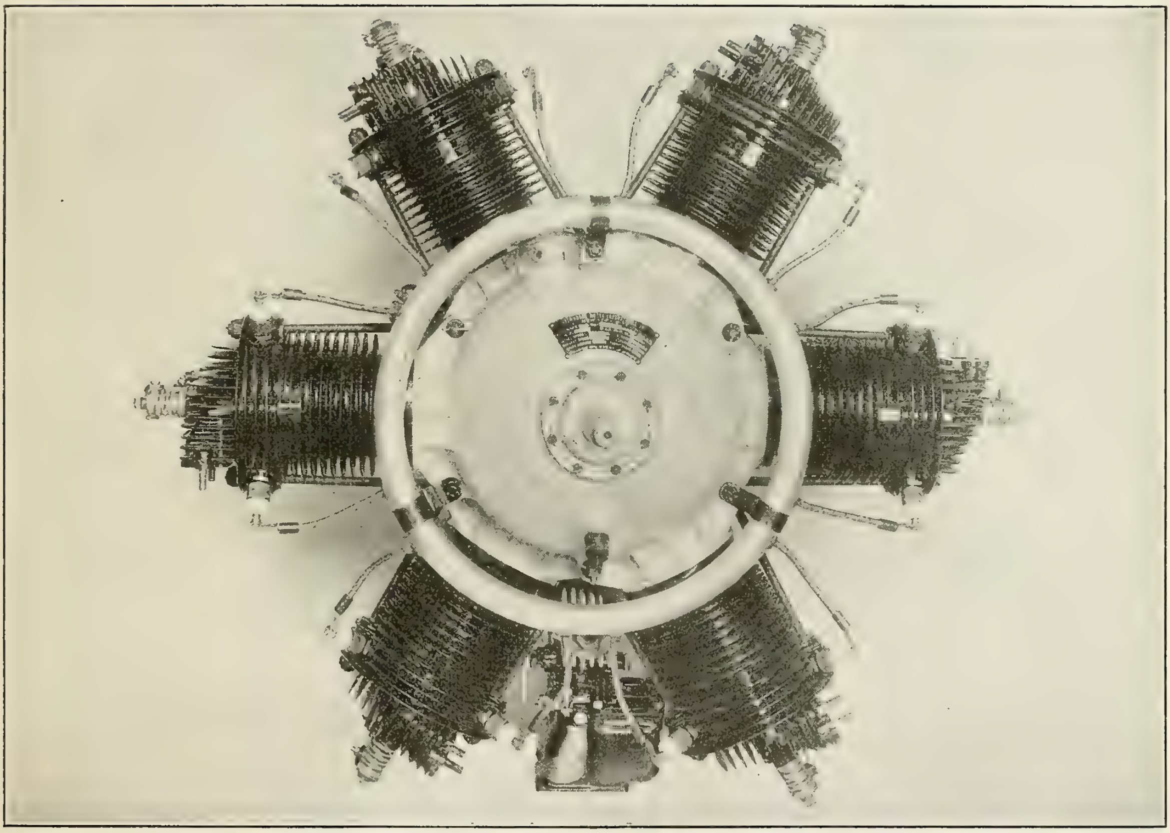
Brownback C400

TIGER

SMOOTH, VIBRATIONLESS POWER



DEPARTMENT OF COMMERCE APPROVED TYPE CERTIFICATE No. 33

Correct design and sturdy construction mean more flying hours at lower cost

THE Light Manufacturing and Foundry Company announces the Brownback "TIGER"... a new aircraft engine which delivers smooth, tireless vibrationless power for a greater number of hours in the air than has heretofore been possible.

The first cost is low — the maintenance cost is almost unbelievable. Complete simplicity of construction, the accessibility of all parts, and the ease of servicing, reduce inactive hours and repair costs to the very minimum.

The Brownback "TIGER" will break all records for economical operation and sustained service over long periods of time.

It develops its 90 h. p. at an extremely low r. p. m., reducing vibration and engine-strain. This is a particularly serviceable engine for training or instruction planes. Write for descriptive literature which contains a complete description of the distinctive design and unusually sturdy construction of the "TIGER" engine.

A "TIGER" engine has been installed in our Demonstration Plane and we will be glad to arrange a thorough demonstration of this revolutionary aircraft engine in the air. See us at the International Aircraft Show, St. Louis. Aeronautical Division, LIGHT MANUFACTURING & FOUNDRY CO., Pottstown, Pa.

(Continued from preceding page)

pump and provides a mounting flange for a starter.

The pressure lubrication system is of the conventional dry sump type. A triple pump consisting of three pairs of gears is employed. One pressure pump forces oil to the master rod bearing and the cam and necessary drive shafts. The oil mist thrown off from the crankshaft lubricates the pistons, piston pins and main and thrust bearings.

The oil accumulating in the crankcase drains into an oil sump, provided with cooling fins, from which it is pumped out and returned to the oil tank by one of the scavenger pumps. The other scavenger pump draws the accumulating oil from the gear case, returning it to the oil tank.

A Stromberg type NAR-3 carburetor, especially designed for this engine, is attached to the combination oil sump and carburetor adapter. This combination oil sump and carburetor adapter is mounted directly to the crankcase between the two lower cylinders. After the intake enters the crankcase it is distributed through an integrally cast inlet manifold leading to the inlet tubes through which it is directed into the cylinder head inlet ports.

The Model R-266 is furnished complete with propeller hub, exhaust ring, and carburetor air heater. The dry weight of the engine, without propeller hub, exhaust ring or heater, is 214 pounds. The weight of the propeller hub is five pounds six ounces.

Specifications

Number of cylinders	5
Bore	4.25 inches
Stroke	3.75 inches
Piston displacement per cylinder	53.197 cubic inches
Total piston displacement	265.987 cubic inches
Compression ratio	5.55 to 1
Weight of engine, dry	214 pounds
Weight per horsepower	2.37 pounds
Rated power	90 horsepower at 2,375 r.p.m.

STREAMLINE and ROUND DRAWN TIE RODS

By R. G. Diehl

STREAMLINE and round drawn tie rods have contributed much toward increasing the speed, decreasing the weight and improving the performance of the modern airplane.

The steel used in the manufacture of tie rods is produced by the open hearth, electric or crucible processes and is designated as No. 1045 and 1050 steel. It must be homogeneous and free from excessive non-metallic inclusions. It is put through a special process of normalizing, known as "patenting" which brings the carbon into the sorbitic condition and makes the steel especially tough, permitting it to stand a large amount of cold work. It is drawn true to gauge and to a tensile strength of 140,000 to 160,000 pounds per square inch. Following the patenting process, the reduction to the streamline or round section is performed by cold work. The steel is not subjected to heat treatment after reduction.

Streamline tie rods are made by passing the steel rod through grooved rollers, which operate under a variated or adjustable pressure. Considerable experience is required to determine the best diameter for the rolls, and the best series of grooves in the rolls to produce a finished streamline section of the correct form and strength. Considerable skill is also required in determining the number of "passes" and amount of applied pressure necessary to obtain the required finished length. The tie rod can be rolled to any desired length of streamline section or combinations of streamline and cylindrical sections.

Tie rods of streamline construction are used chiefly for external bracing, where the tie rod comes directly in contact with the air stream. This applies principally to the interplate, center section and tail surface bracing. Because of their elliptical cross-sectional shape, they offer little resistance or drag, and also eliminate the "hum" or vibration which is very objectionable in the cable.

Round tie rods are cold drawn by a special process which conforms to the best practice of cold drawing steel wire. The abusive swaging process which destroys the structure of the steel is not used. The drawing of a round-section from the original round steel rod insures an even flow of metal, giving a finished product that is homogeneous in structure and of great tensile strength. The wrench grips at both ends permit the rod to be adjusted properly to the desired tension. Because of its round shape, the rod can be adjusted to any degree without danger of having sharp edges come in contact with one another. They are used almost exclusively for internal drag bracing in the wing panels, and diagonal bracing in the fuselage. They are superior to the old method of hard wire, being lighter, stronger, and less subject to "stretch."

Streamline and round drawn tie rods may be equipped with either the standard rigid or Macwhyte safe lock terminals. They are usually equipped with one right and one left hand threaded terminal, making the tie rod virtually a turn-buckle in itself.

The Macwhyte safe lock terminal has all the advantages of the standard rigid terminal, and in addition, has certain features which recommend it to those who desire the maximum safety and reliability.

Tests with the standard rigid terminals have proved that it is possible to set up torsional stress in the tie rod by tightening the lock nut too tight against the terminal. In the smaller sized tie rods it is quite possible, with very little effort, to shear or fracture the tie rod completely.

Where the human element enters in construction the elimination of possible sources of errors increases the factor of safety.

Cadmium plating is used in protecting tie rods and terminals. The plating is applied after the threads have been cut, thus insuring an effective and approved protection for both the rod and the terminal. The coating is smooth and of uniform thickness, insuring long life for the tie rod and obviating the necessity of periodic painting, doping, etc.

Cadmium plating is more effective than zinc in resisting corrosion and at the same time is approximately one-tenth the weight of zinc. It penetrates the surface, becomes a part of the metal and, as a result, does not crack or flake.

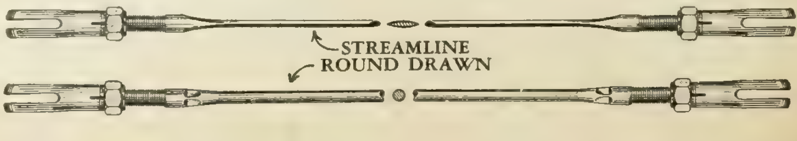
Tests and inspections play an important part in the manufacture of tie rods. Test specimens are taken from each coil of wire, from which the tie rods are to be made, and are marked for identification with the coil from which they are taken. These specimens are then subjected to a tensile and reverse bend test. Inspection is made of each tie rod following each process of manufacture. A final inspection is also made before packing and shipment.

In order to insure the best of service from tie rods there are precautions which must be observed in assembling them on the airplane.

In rigging, care should be taken to see that they are taut to eliminate the possibility of vibration or "flapping." They should not, however, be too tight, for considerable initial tensile stress may be set up. Where double or duplicate tie rods are used they should be "tuned" perfectly, to insure an equal distribution of load between them. Overloading, resulting from excessive landing shocks or some types of acrobatic flying, is very likely to occur. A careful examination of the tie rods should be made after such occurrences, for there may be a partial fracture and complete fracture may occur in the air on the next flight. Many vibration and fatigue tests have been conducted on tie rods, but in none of these tests have the conditions been varied in the manner necessary to give truly comparable results.

From experience and information that has been obtained from airplane operators, it is recommended that streamline tie rods should be changed after 1,500 to 2,000 hours of flying. This would depend largely upon the type of ship, nature of the flying, and the general efficiency of the ground crew in rigging and inspection.

Tie rods have been made standard equipment on practically all of the airplanes manufactured today. Their great strength as compared to weight, their low parasite resistance, and the speed in which they may be assembled to the airplane, have established for them an enviable position in the accessory field of aeronautics.



TO THE ENDS OF THE EARTH

COMMANDER BYRD—CAPTAIN WILKINS AND CLOVER COMPOUND

Utmost precaution shown in selecting only the best has always been the rule in organizing polar expeditions—the reason is obvious.

It was a great day for us when Commander Byrd selected *Clover Grinding Compound* for his North Pole flight—**but greater yet when he reasserts his confidence by again making Clover Compound exclusively his choice for his more important South Polar Expedition.**

The same thing happened with Captain Wilkins, who also took **CLOVER COMPOUND** with him when he flew over the North Pole, and now the only grinding compound he has with him on his South Pole Expedition is Clover—and, by the way, he also has taken with him the ***Clover Color-Stripe Abrasive Papers and Cloths.***

With unlimited opportunity for choice, if these experts have selected Clover Products as being the best of their kind, they should certainly be good enough for you—but, be your own judge, the best costs no more to buy, and costs nothing to try.

E. B. GALLAHER:
Clover Mfg. Co., Norwalk, Conn.
You may send me, without obligation:

☐ Sample Clover **Grease-Mixed** Grinding Compound—the kind the Government is buying.
☐ Clover **Water-Mixed** Valve-Grinding Compound. In its class, there's nothing better.
☐ **Green-Stripe** Sandpaper.
☐ **Red-Stripe** Turkish Emery Cloth—for polishing.
☐ **Yellow-Stripe** Aluminous•Oxide Cloth—for cutting hard metals. The universal shop abrasive.

Name

Address

Character of business

SIKORSKY S-40 FLYING BOAT

PRELIMINARY work has been begun at the Sikorsky factory in Bridgeport, Connecticut, on the first two planes of the S-40 series. It is expected that these ships will be completed before the end of the year and will immediately go into service on the Miami-Panama route of Pan American Airways, which it is estimated they will be able to fly in approximately twelve hours, or one daylight journey. This will save two full days for mail and passenger service between the United States and the west coast of South America. At present mail carried by the Pan American Airways takes three days for the trip from Florida to Panama.

The S-40, as an amphibion, will have a useful load of 11,250 pounds and on short flights could, without crowding, carry forty-one passengers and a crew of four. For the particular service intended by Pan American Airways, however, it will be necessary to carry a large fuel load and allow for 1,000 pounds of mail. It is probable, therefore, that for this route the ships will be designed for sixteen to twenty-four passengers and fuel capacity to allow for non-stop flights of at least nine hours.

The S-40 can be equipped with any type of engine of high power, but it is planned for the first two ships to use four Pratt & Whitney Hornet B engines of 575 horsepower each, giving a total of 2,300 horsepower. These power plants will give the ships a high speed of 129 miles an hour and a cruising speed of 108 miles an hour. The engines will be laterally in line, suspended from the wing. This arrangement is the result of many years' experience by Mr. Sikorsky, dating from his first four-motored ship, built in Russia in 1913. In describing the design, Mr. Sikorsky said that because of this arrangement of the engines, "the upper wing connected by outriggers with the tail surface will all be operating in entirely unobstructed air. Outriggers will act as powerful fins and the tail surfaces work in the down wash, but in other respects in unobstructed air as probably on no other airplane.

"Another reason for the general outline of the S-40 is, therefore, the very reliable data from the standpoint of the whole aerodynamic control and all general qualities which were proved on the S-38 airplane."

The S-40 will be a real ocean-going plane, the hull having been designed to withstand storms at sea.

Twelve months were spent in the design of the ship, including a very exhaustive research in wind tunnels and water basins. The engineering department of the Sikorsky Aviation Corporation furnished the following general description:

The extra large displacement of the hull and properly designed lines promise to give exceptional seaworthiness. The size of the hull permits unusual room for passenger compartments. The size of these compartments, combined with unobstructed vision and excellent ventilation, will give accommodations as fine as on any other plane now existing in the United States. Roomy toilets, wash-room, kitchen and permanent quarters for the crew will be provided. For comfort in long travel with sixteen passengers as normal load, the third passenger compartment could readily be converted to a dining room such as is found on steamships.

Special attention has been given to the design of the structure to provide easy maintenance and protection from corrosion.

Power plant units complete with oil tanks will be easily interchangeable. Pilot's cockpit can be used either open or closed. Engines will be provided with starters and adjustable metal blade propellers.

A hoisting sling ample to raise the entire ship on a boom will be provided. Arrangements will be made to tow from the bow. When the ship is used as a seaplane, it will be taxied on a dolly so designed as to permit easy installation while the ship is afloat.

Storage space and hoisting arrangement will be provided for carrying a spare engine. Davits will be provided in the front marine compartment. Cleats will be provided for mooring a launch fore and aft. A walkway will be provided along the lower structure to the pontoons.

Fuel tanks will be located in the wing with gravity feed and capacity for four hours' flight. The balance of the fuel will be carried in the tanks located on the top of the floats. Cross feed valves will permit any engine to be supplied from any tank. Refueling caps, one and three-quarters inches in size, will be provided in the pontoons for rapid refueling from a launch while afloat. A special compartment of 250 cubic feet capacity will be provided for luggage and mail.

The airplane will be able to fly and climb with any one engine stopped, carrying full load.

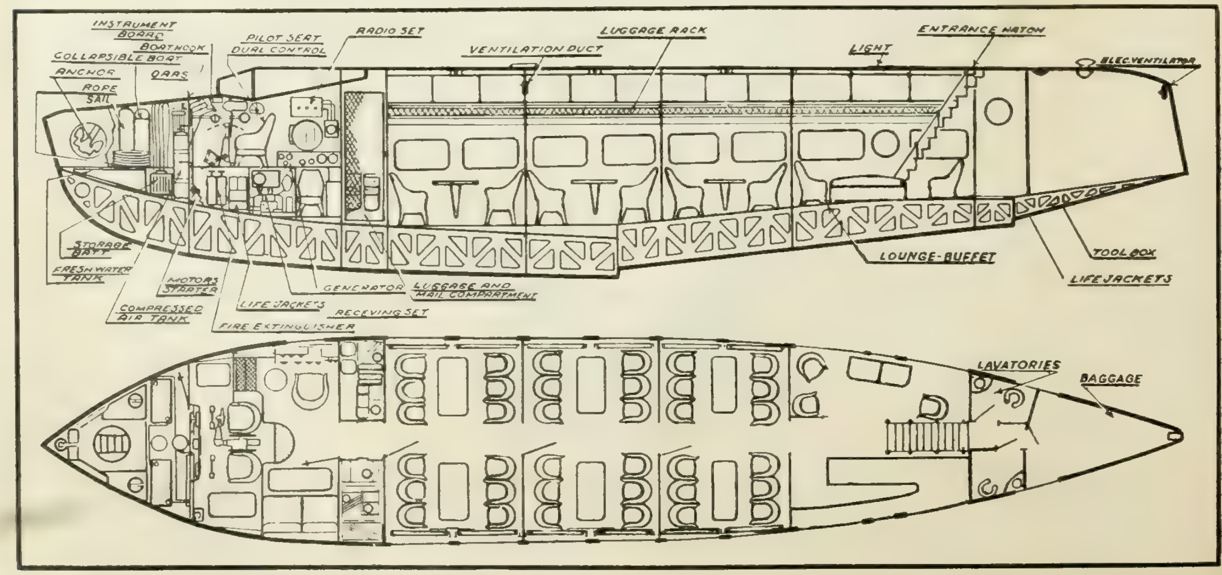
The boat hull will have ample flotation with not less than five water-tight compartments, any two of which will keep the ship afloat.

Double pilot control will be provided.

There will be three emergency exits in addition to the main entrance. No passengers or crew are located in the plane of rotation of the propellers. The propeller clearance from the water will be eighty inches. The main entrance will be so located as to permit passengers to board the ship with comfort and complete safety while the engines are running, either on land or water. The location of the engines, no engines or propellers being in front, will provide good visibility for the pilot.

Ample space is provided for radio equipment.

In case of damage to the side floats, the



Plan and sectional drawings of the hull, Sikorsky S-40 flying boat now under construction at Bridgeport, Connecticut gas tanks will be capable to keeping the ship in balance while afloat.

Position of the tail surfaces high above the water will prevent their being damaged.

The lateral position of the motors will permit perfect control on the water regardless of wind, tide and currents.

The wing construction of metal with fabric covering will reveal any damage before the danger point is reached. The absence of the lower wing prevents danger from unnoticed corrosion.

The wings will be all-metal dural construction covered with fabric. Spars will be open section Warren trusses riveted and bolted on gusset plates. Ribs will be of dural. Leading edge will be partly covered with dural sheet to obtain correct shape of the airfoil and also for extra rigidity. Ailerons will be of the balanced type and so constructed as to reduce vibration at high speeds. Hinges will be readily accessible for check and greasing. Ample openings for inspection will be provided throughout on the wing. Interior bracing will be high grade round and square steel tie-rods. Before covering, the structure will be painted with proper protective paint.

Dural streamline tubes and structural dural boxes will be used for struts. Lower structure will be readily accessible for painting and greasing to prevent corrosion.

The hull structure will consist of dural open sections riveted to the skin, which will be of Alclad sheet. "Auld-metal" floor will give a neat appearance and long life. Bottom structure is said to be so designed that no water will be able to stay in hidden places. Ample ventilation and accessibility will be provided for the entire bottom structure. A strong keel will be provided.

Gasoline and oil tanks will be of riveted dural sheets.

Controls will be of the same type as on the S-38-B amphibion with the addition of a dual control combination. Ball bearings will be provided on all control mechanism.

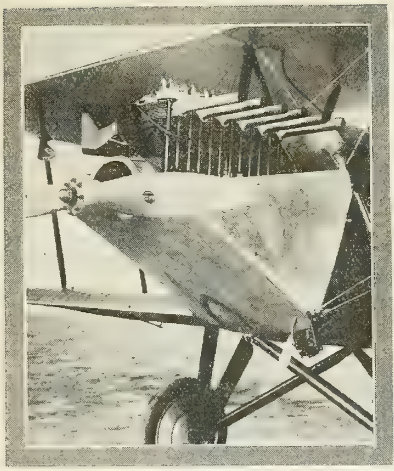
The airplane will be completely equipped with engines, flight and navigation instruments, marine equipment, chairs for twenty-four passengers, sleeping quarters for the crew, kitchen and buffet arrangements, separate toilet facilities for ladies and gentlemen, fire apparatus, life preservers, and complete equipment as required by the Department of Commerce.

Dimensions

Wing spread	114 feet
Chord	192 inches
Height (on wheels)	22 feet 11 inches
Length overall	72 feet 11 inches
Wing area	1,980 square feet
Power (4 P. & W. Hornet B)	2,300 h.p.

Performance

Useful load	11,250 pounds
High speed (sea level)	129 m.p.h.
Cruising speed (1,700 r.p.m.)	108 m.p.h.
Climb (1st min., full load)	675 feet
Ceiling	13,000 feet
Stalling speed	65 miles per hour
Cruising speed on 3 engines	90 to 100 miles per hour
Weight of amphibion gear	1,250 pounds



Waco with Franklin Automobile Engine

WACO IS FLOWN WITH 95 H.P. AUTO ENGINE

A WACO airplane equipped with a stock Franklin automobile engine recently made a flight of over an hour at the Municipal Airport, Dayton, Ohio. A standard Waco, manufactured by the Waco Airplane Company of Troy, Ohio, was used, the only modification being the engine mount, which was made to accommodate the Franklin engine.

The engine used in the experiment was a six-cylinder, air-cooled automobile engine weighing approximately 550 pounds and developing 95 horsepower at 3,100 revolutions per minute. An air-speed of eighty miles per hour was attained on the flight which was supervised by the Johnson Airplane and Supply Company of Dayton, Ohio. Al Johnson, president of the company, piloted the plane during these demonstration flights.

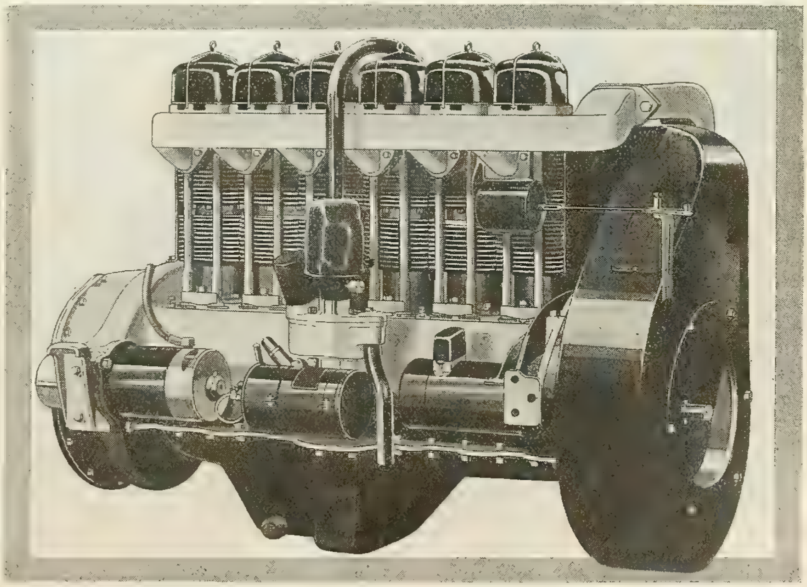
FUEL LINE FITTINGS

THE Imperial Brass Manufacturing Company of Chicago has developed and started production of the Hi Duty Sky Service Connection fuel line fitting, according to a recent announcement. The Hi Duty connection has been designed as a vibration-proof and leak-proof fitting with the object of preventing fuel line failure.

NOTES ON WELDING

ACCORDING to Charles E. Kirkbride, Jr., Assistant Chief Draftsman, Naval Aircraft Factory, Philadelphia, the development of torch manipulation has been a major contributor to the success of welding in aircraft, but equal significance can be attached to the development of welding jigs. He also stated that one of the most important factors resulting from the use of a welded joint is rigidity. The material presents work in tension as well as in compression and therefore has a lower average intensity of stress as well as a more uniform distribution in comparison with a riveted joint. He mentioned the following items that should be avoided in aircraft welding:

Edge welding is one of the most prolific sources of cracked welds. The joint should not be loaded with surplus metal, for this only adds weight and a better chance for cracking. Tension welds are avoided if possible. Two welds are not made too close together in thin gage material because there is not enough metal available for proper stretching to meet the double shrinkage, and cracks will be the result. Both sides of a thin sheet should not be welded unless absolutely necessary. The practice of filling holes with weld should be discouraged. The use of any kind of welding rod should be prohibited; in the absence of specific instructions, low carbon steel rod is the best. Frequent inspection is of extreme importance and parts should occasionally be tested to destruction.



The New Franklin air-cooled automobile engine used successfully in a Waco airplane

LOW WEIGHT PER H. P.
or
LOW FUEL CONSUMPTION

John H. Geisse, Comet Engine Corp'n

ASK any airplane operator or engineer the importance of light weight per horsepower in aviation engines, and he will almost invariably reply that it comes second only to reliability, and by reliability he does not mean durability or length of engine life but only freedom from forced landings. In only a few cases will fuel consumption be considered and in these cases it will likely be considered only as a relatively unimportant item in the overall power plant weight. A few—this is a development of only the last two years—may give some consideration to the durability of the engine.

Fuel consumption, as viewed from the standpoint of fuel cost, is generally considered as a relatively small percentage of the total cost of operation. To some extent, perhaps, this is a reflection of the often-expressed statement that miles-per-gallon do not comprise an important item with American motorists. The latter statement is, of course, quite true but the equally frequent statement that fuel consumption in automobiles is not a sufficiently large item in total cost to warrant consideration by the owner, is not true. Actually the item of fuel cost may be close to twenty per cent of the total cost of operation as shown in the accompanying table of operation costs for an average car. In the automobile, then, it is not an item to be lightly considered.

Almost any one would assume that this item would be less important in the operation of an airplane than in the operation of an automobile because of the greatly increased initial cost of an airplane and the much greater insurance rate. Just how far wrong such an assumption would be is clearly shown in the table of operating costs of an average three-place open cockpit plane. The fuel cost in the operation of a plane, instead of being less important than in the operation of an automobile, is much more important. Instead of representing approximately twenty per cent of total cost, it represents approximately thirty per cent and is the largest single item of expense. In fact, in the example chosen, the cost of fuel for one year's flying amounts to $1,250. A reasonable net return from the operation of the plane for one year would amount to $600, or about one-half the fuel cost.

Fuel consumption, then, taking into consideration the cost of carrying the fuel in the plane as well as the fuel cost, is something to be considered very seriously in the choice of aviation power plants. A simple analysis of the cost figures shown makes quite clear the relative importance of fuel consumption and weight per horsepower. Let us assume an engine weight of 400 pounds, a useful load of 500 pounds, and a fuel capacity sufficient for six hours, or 378 pounds. Now suppose the engine and fuel load is increased from 778 to 779 and the useful load reduced from 500 to 499. To retain the same cost per hour per pound of useful load it would then be necessary to reduce the hourly cost in the ration of 499/500, or from $8.44 to $8.423. The new figure for fuel cost would then be $2.50 minus .017, or $2.483; and the hourly consumption would have to be reduced to 9.93 gallons. This would give a weight of 375 pounds for six hours fuel and leave 779 minus 375, or 40 pounds for the new engine weight.

Changing these figures into terms customarily used in engine specifications, assume that the initial engine had a specific fuel consumption of .5 pound in the cruising range and developed 160 horsepower at full throttle, giving a weight per horsepower of 2.5 pounds. This engine would then be on a par with an engine weighting 404 pounds or 2.52 pounds per horsepower with a specific fuel consumption of .5 × 9.93/10.00, or .4965 pound per horsepower hour.

These results, based on the use of a fuel of uniform standard, indicate that the general trend in this country toward the attainment of high mean effective pressures by supercharging, is in error. With a given grade of fuel and compression ratios adjusted to this fuel, unsupercharged engines have better fuel economy than can be obtained with supercharged engines. This applies to all degrees of supercharging. Supercharging, therefore, accomplishes a weight reduction of the engine only with a sacrifice in economy. Their use has been dictated to a great extent by the plane manufacturers through their choice of engines primarily on the weight basis. The figure generally accepted as the value of a pound saved is $9 and it is therefore quite natural that weight consideration should be given first importance. In the case under consideration, however, a pound saving in weight which even slightly increases fuel consumption, is not warranted.

For school work, especially where a large proportion of operation is at full throttle, the use of high mean effective pressures is uneconomical. In many of our air-cooled engines having high performance characteristics, it is necessary to have a specific fuel consumption close to .65 pound per horsepower hour for satisfactory cooling at full throttle. Moderate mean effective pressures permit this value to be reduced to .55 pound. The permissible increase in engine weight which would be justifiable to secure a reduction in specific fuel consumption from .65 pound to .55 pound can be determined as before. In school work it will be necessary to consider the payload as one passenger with an average of 180 pounds. The hourly fuel consumption with the high performance engine will be taken as 10 × .65/.50, or 13 gallons, costing $3.25. This would increase the hourly cost of operation from $8.44 to $9.19. The cost per hour per pound of useful load would become 9.19/180, or $.051. Now suppose we reduce the fuel cost from $3.25 to 3.25 × .55/.65, or $2.75, and thereby the total operation cost to $8.69 per hour. To maintain the same cost per pound of payload (i. e., $.051), the payload could then be 8.69/.051, or 170 pounds. The permissible increase in engine and fuel weight would therefore be 10 pounds. Since the fuel weight would be decreased from the original amount of 378 pounds to 378 × .55/.65, or 320 pounds, for the same number of flying hours, the permissible increase in engine weight would be 58+10, or 68 pounds. In terms of weight per horsepower, this would mean an increase from 2.5 pounds to 2.92 pounds permissible if the specific fuel consumption were reduced thereby from .65 to .55 pound. This weight increase can also be translated into a reduction of mean effective pressure from 125 pounds per square inch to 107 pounds per square inch.

All of the conclusions reached by this analysis are quite at variance with popular conceptions, but it is believed that the figures are reasonably correct. The methods of reaching the conclusion are shown in each case except that of the value of a pound saving in weight. This figure is so high that an explanation is required.

This figure is determined in much the same manner as are the others. It was shown that an increase in engine or structure weight of one pound at the expense of useful load required a reduction in hourly operating cost from $8.44 to $8.423, or $.017. For this determination the same reduction must be made in the item of depreciation, bringing it down from $2.40 per hour to $2.383 per hour, since the original cost must be reduced from $6,000 to 6,000 × 2.383/2.40 or $5,960—a saving of $40.

The discrepancy between this value and of $9 more generally accepted may be explained. The hourly cost of operation was given as $8.44, making the cost for 2,500 hours $21,100. Dividing this figure by the weight of the fully loaded plane (2,200 pounds) gives a cost of $9.58 for carrying one pound throughout the life of the plane, and this figure is correct if taken as the value of a total saving of one pound in the entire plane. It is incorrect, however, if taken as the value of the saving of one pound in any one part, since the saving of one pound in an individual part permits a reduction in weight of all other parts and thus, in turn, a reduction of power and fuel required. Roughly, a saving in weight of ¼-pound in the engine will result in a total decrease in loaded plane weight of one pound, making the value of this saving $9.58, or at the rate of 4 × 9.58 per pound. This figure, $38.32, checks closely the former figure of $40 per pound.

The conclusions given above, as well as the steps used in arriving at them, should be of particular interest to aircraft operators, since their requirements will guide the future characteristic trends of aircraft engines.

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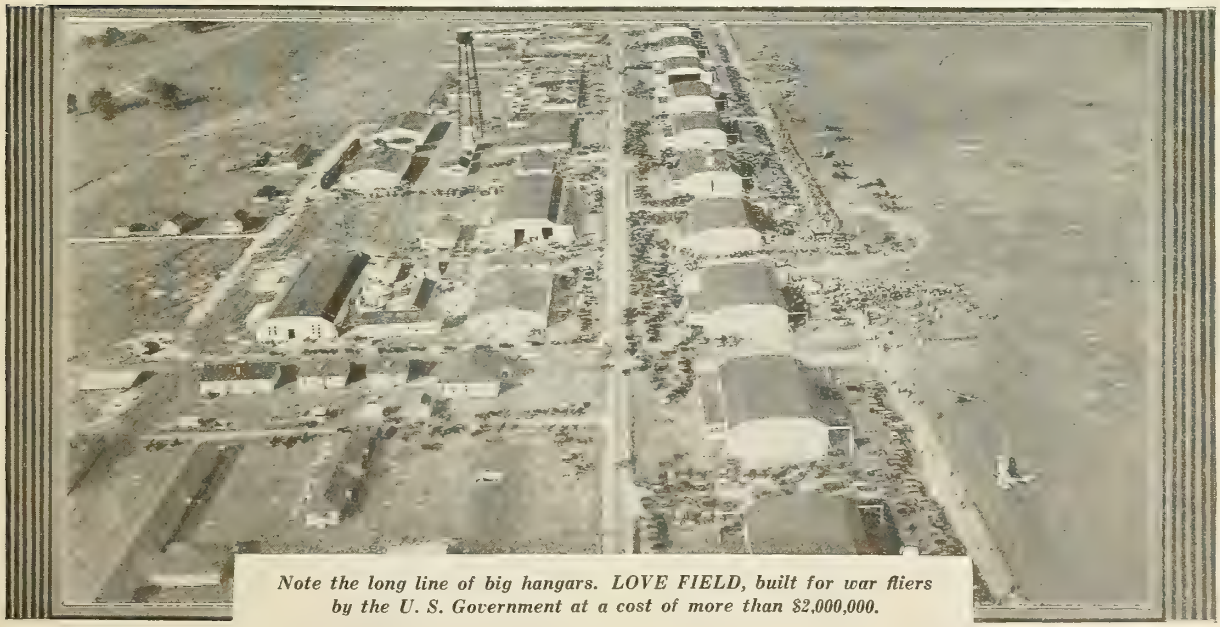


Note the long line of big hangars. LOVE FIELD, built for war fliers by the U. S. Government at a cost of more than $2,000,000.

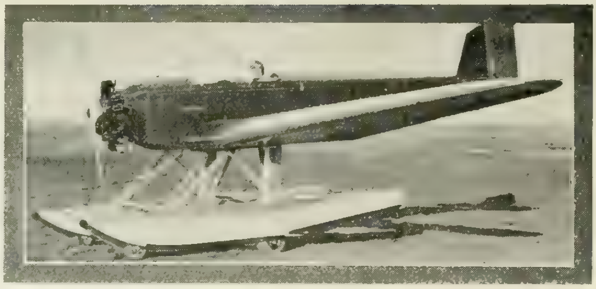
DALLAS AVIATION SCHOOL AND AIR COLLEGE

DALLAS, TEXAS

UPPERCU-BURNELLI

MODIFIED AEROMARINE - KLEMM

Amphibion Seaplane



TO meet the demand for an amphibion combining surplus of efficiency factors and convenience with safety, the Uppercu-Burnelli Aircraft Corporation has developel a low-wing monoplane type with wheels that retract into the floats. The amphibion was developed after the patents obtained by Vincent J. Burnelli and is the first of its type to be built.

The machine was finished during December and its test flights commenced shortly before the new year. It has been flown by Everett Fisher under many conditions and circumstances and a partial list of performance has been compiled. More than thirty flights were made from the factory flying field on Raritan Bay before the amphibion was publicly shown. Then Mr. Fisher flew it from Keyport to both the Newark (New Jersey) Municipal Airport and to Roosevelt Field, Long Island. Owing to the novelty of its design it attracted much interest. When the pilot flew it across the tarmac it was thought that he was trying to land a "float job" and that the ship was sure to crack-up. Landings and take-offs were made with ease, however, the wheels projected just prior to landing.

The U. B. amphibion is a low-wing monoplane of the same type as the Aeromarine-Klemm, which is also manufactured by the corporation and (except for the wheels) is similar to the Aeromarine seaplane.

The center section has a span of 91 inches. The dihedral angle of the outer panels is three degrees, measured on the top surface. Ailerons measure 15 inches by 86.25 inches. The chord of the wing at the outer end of the aileron is 41.1 inches.

The outstanding feature, of course, is the amphibion twin float arrangement designed by Harold D. Kantner, chief of the pontoon division of the corporation. Probably the most significant element of this Burnelli patent is the fact that floats of this type may be made of any size, making it possible to design and build giant amphibion transports suitable for overseas flights.

The following points have been emphasized in developing the U. B. amphibion:

It is a tractor, thus reducing the danger to the pilot and passenger in the event of a crack-up.

The landing gear consists of four wheels, the forward pair preventing any possibility of a nose-over.

Tests showed that it is possible to land safely in water with the wheels extended. This is due to the fact that the larger wheels are located at the deepest point of the floats.

Brakes on the rear wheels can be used to bring the amphibion to a short stop after landing on earth. These are "spoon brakes" and are positive in mechanical action.

It is impossible to jam the hydraulic action of retracting or extending the wheels.

The floats, which are 175 inches long, have eight compartments. The floats are set 77 inchest apart on centres. They are constructed of wood and Alclad. The skin, which is of unusual thickness, supplies much of the strength to the the float structure.

There are no mechanical devices under water at any time.

The well for retracting the main wheel is not closed; since there is a second step in the bottom of the float, the well is removed from the resistance element.

There is good visibility for the pilot. The amphibion taxies in flying position with the wings at a zero angle of incidence. The four-wheel landing gear contributes to this feature, for the tail is always raised.

Entry and exit to cockpits is from the rear, obviating danger from the propeller.

Wheels used are Musselmann type, the rear being 16 by 7 inches and the front 12 by 5 inches. In the Aeromarine seaplane the twin floats weigh 215 pounds; in the B. U. amphibion they are 55 pounds heavier or total 270 pounds. There is no chance of the pilot's forgetting the position of the wheels since there is a flag "tell-tale" on either side of the cockpit. The action needed to extend or retract the wheels is slight and offers no difficulty when in flight. Retraction and extension is controlled by a pumping motion. The following table shows the time required to retract and extend the wheels.

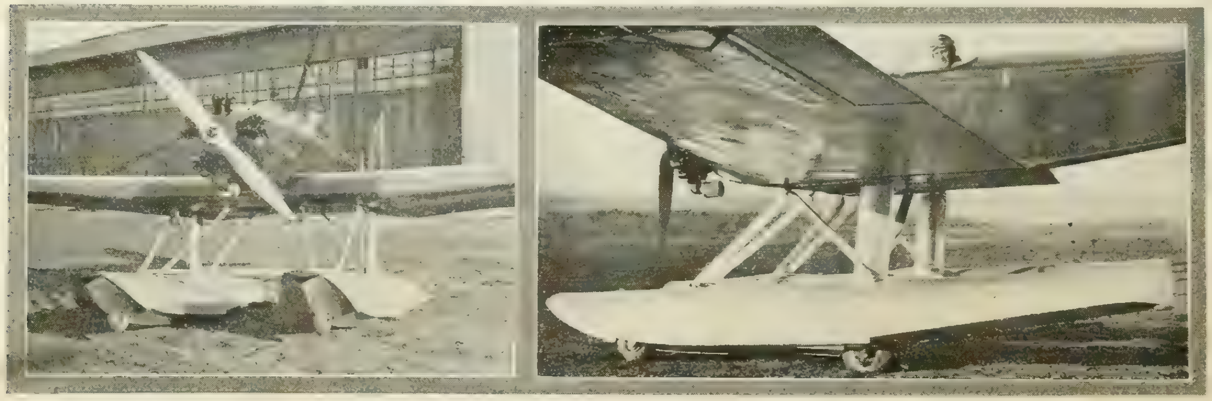
To retract wheels on the ground	3 seconds
To extend wheels on the ground	30 seconds
To retract wheels in the air	7 seconds
To extend wheels in the air	10 seconds

The pressure in the rear wheels is twelve pounds; in the front wheels, six pounds.

The performances given are but a crieterion of the work that can be done with this amphibion. Tests are soon to be made with the inverted type Cirrus 100 horsepower motor and the performances of the amphibion will be correspondingly improved.

Dimensions and Specifications

Wing span	482 inches
Chord, maximum, at body	79 inches
Length overall, at fuselage	281 inches
Span of tail surfaces	132 inches
Weight empty	1,311 pounds
Useful load	500 pounds
Gross weight	1,950 pounds
Wing area	210 square feet
Aileron area	18.3 square feet
Stabilizer area	19.5 square feet
Elevator area	13.6 square feet
Fin area	3.8 square feet
Rudder area	7.0 square feet
Gas capacity	30 gallons
Oil capacity	2 gallons
Radius of operation	450 miles
Power at 1,950 r.p.m.........	90 horsepower



The LeBlond-powered Uppercu-Burnelli amphibion which is provided with a four-wheel landing gear

Propeller diameter	86.5 inches

Performance

(Determined by actual flight tests)

High speed	100 miles per hour
Low speed	45 miles per hour
Time required for land take-off	5 to 9 seconds
Time required for water take-off	17 to 20 seconds
Crusing speed	80 miles per hour

SCHOFIELD ALBATROSS

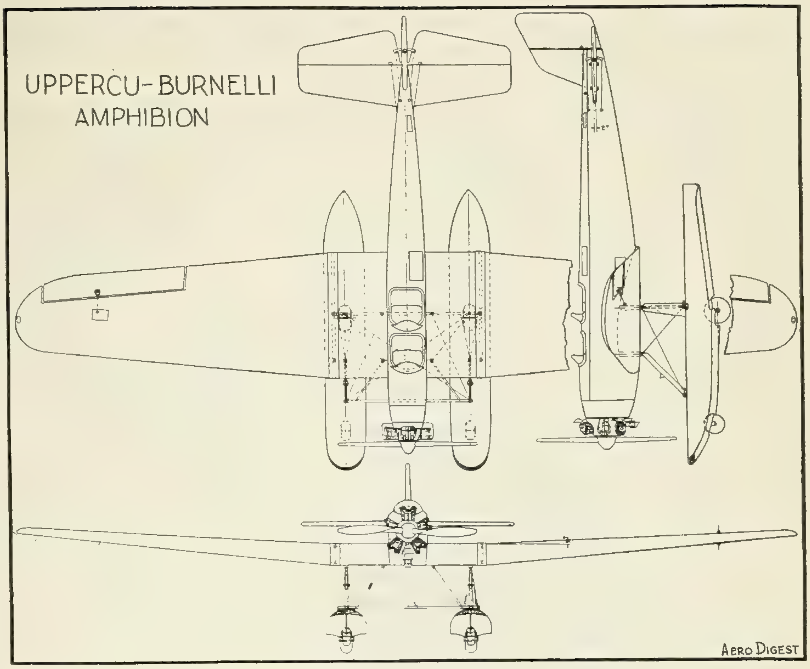
POWERED with three Axelson Series A seven-cylinder radial engines, the Schofield Albatross, now in use in Los Angeles, is said to have good speed and maneuverability for a ship of its size. Built by Schofield, Inc., in its Los Angeles plant, this ship was powered with Axelson engines after smaller engines had been tested and found less satisfactory. The length of the fuselage is 56 feet; overall height, 14 feet; wing span, 90 feet; wing chord, 12 feet. Total wing area is 1,032 square feet.

There is a pilots' cockpit for two pilots and a navigator. This cockpit is equipped with a complete set of navigation instruments, which includes an earth inductor compass and Paulin altimeter.

The main passenger cabin is large and roomy. There are nine leather-covered, fully-reclining seats and an additional adjustable bench or couch which accommodates two or three passengers. In addition to the dome lights in the cabin, each chair has an individual reading light. The cabin is finished in natural gum plywood, with a cork linoleum floor and with an inner-lining of Balsam Wool. To the rear of the cabin there is a large dural-lined lavatory, and in the rear of this is a baggage compartment supplementing another large baggage compartment under the pliot's cockpit.

The ship is equipped with retractable landing lights and emergency night-landing parachute flares.

The weight of the ship empty is 7,600 pounds, with a gross load of 13,000 pounds. It has a fuel capacity of 415 gallons of gasoline and an oil capacity of 80 gallons. The Axelson engines total 345 rated horsepower, giving the ship a high speed of 125 miles per hour, and a cruising speed of 105 miles per hour. Gas consumption is between 20 and 25 gallons an hour at cruising speed. This gives a minimum cruising range of 1,200 miles. Fully loaded, the ship will climb at sea level 500 feet per minute, and has a landing speed of 25 miles per hour.



FLOW AND FORCE EQUATIONS

N. A. C. A. report No. 323, submitted by A. F. Zahm to the National Advisory Committee for Aeronautics for publication, is a slightly revised form of U. S. Navy Aerodynamical Laboratory Report 380, completed for the Bureau of Aeronautics in November, 1928.

Part I gives a general method for finding the steady-flow velocity relative to a body in plane curvilinear motion, whence the pressure is found by Bernoulli's energy principle. Integration of the pressure supplies basic formulas for the zonal forces and moments on the revolving body.

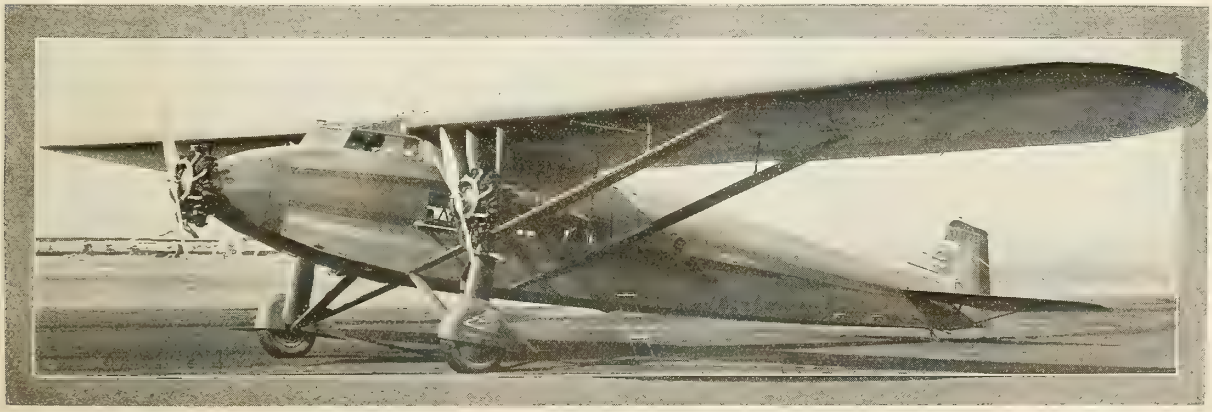
Part II, applying this steady-flow method, finds the velocity and pressure at all points of the flow inside and outside an ellipsoid and some of its limiting forms, and graphs those quantities for the latter forms.

Part III finds the pressure, and thence the zonal force and moment, on hulls in plane curvilinear flight.

Part IV derives general equations for the resultant fluid forces and moments on trisymmetrical bodies moving through a perfect fluid, and in some cases compares the moment values with those found for bodies moving in air.

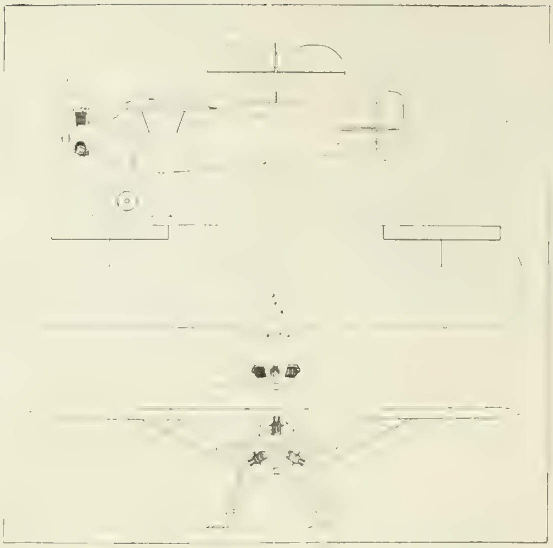
Part V furnishes ready formulas for potential coefficients and inertia coefficients for an ellipsoid and its limiting forms. Thence are derived tables giving numerical values of those coefficients for a comprehensive range of shapes.

Report No. 323 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.



Trimotored Schofield Albatross monoplane with Axelson engines totaling 345 horsepower

BABY ACE CABIN PLANE



Outline drawings of the Baby Ace monoplane

THE Baby Ace is a single-place cabin monoplane designed by O. G. Corben and built by the Ace Manufacturing Corporation of Wichita, Kan. The present plant and equipment of the manufacturers is capable of turning out three of these light planes a week.

The first tests of the Baby Ace were made recently. With a Szekley 40-horsepower engine turning up 1,900 revolutions per minute, the plane attained a speed of 85 miles per hour. The absolute ceiling was not determined but it is expected to reach 12,000 feet. In its initial tests it reached an altitude of 1,000 feet in one minute and fifteen seconds. The ship was flown over a triangular course of thirty miles during the tests by the use of the rudder alone.

The power plant used on these tests was the Szekley 40-horsepower, three-cylinder, air-cooled radial engine. However, the Baby Ace is designed and stressed for the Samson 9, the Anzani 3 or LeBlond 60 engines.

The wing is of the conventional Clark Y section. The spars are solid and all spars are made in jigs. The interior of the cabin is finished in two colors of leatherette to correspond with the color scheme of the entire plane. Good visibility is afforded the pilot through the arrangement of windows. A wide door allows ease in entering or leaving. Controls are the conventional stick and rudder type. The entire tail unit is of welded steel tubing. The landing carriage is a split axle type, equipped with steel disk wheels. Brakes are provided optionally.

A wooden propeller designed expressly for the light plane is used. The fuel tanks are located in the wings and the oil tank is in front of the fire wall. The wings are wired for night flying equipment and the cabin is furnished with a dome light.

Specifications

Span	25 feet 8 inches
Height	6 feet
Length	17 feet 5 inches
Wing area	108 square feet
Chord	4 feet 6 inches
Weight (empty)	500 pounds
Useful load	300 pounds
Gross weight (loaded)	800 pounds
Power loading	20 pounds per horsepower
Wing loading	7.4 pounds
Oil capacity	2.5 gallons
Gasoline capacity	15 gallons

Performance

Cruising speed	70 miles per hour
High speed	85 miles per hour
Ceiling	12,000 feet

RECENT PATENTS

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D C., at the rate of 20 cents each. State number of patent and name of inventor when ordering.

Flying-machine. William Stelzer, Chicago, Ill. (No. 1,739,630).

Airplane. Albert Winterkorn, Columbus, Ohio. (No. 1,739,703).

Airplane. George E. McCrea, San Francisco, Cal. (No. 1,739,798).

Buoying and driving mechanism for flying machines. Gustaf Heden, New York, N. Y. (No. 1,739,967).

Helicopter. Henry C. Privett, Los Angeles, Cal. (No. 1,739,984).

Aeroplane. Jerry Hubschman, Great Neck, N. Y. (No. 1,740,016).

Assembling and repairing flying-machines. Hugo Junkers, Dessau, Germany. (No. 1,740,021).

Parachute. George M Simmons, Cohay, Miss. (No. 1,740,044).

Aircraft-propelling mechanism. Charles S. Hall, Los Angeles, Cal.; assignor to Hall Engineering & Aircraft Construction Co. (No. 1,740,088).

Propeller-shaft support. Otto Mader, Dessau, Germany; assignor to Hugo Junkers, Dessau, Germany. (No. 1,740,362).

Joint constructor for metal plating of airships. Anthony W. Agler, Los Angeles, Cal. (No. 1,740,492).

Carrying body for rigid airships. Ernst Ruess, Munich, Germany. (No. 1,740,839).

Impervious seaplane-float. Charles A. Van Dusen, Cleveland, Ohio; assignor to Glenn L. Martin Co. (No. 1,740,846).

Propulsion of water craft and aircraft. Donald V. Hotchkiss, Dorset, England. (No. 1,741,238).

Radio direction finder, Hertzian compass, and the like. Henri Busignies, St. Cloud, France. (No. 1,741,282).

Airship. George W. Turner, Excelsior Springs, Mo. (No. 1,741,446).

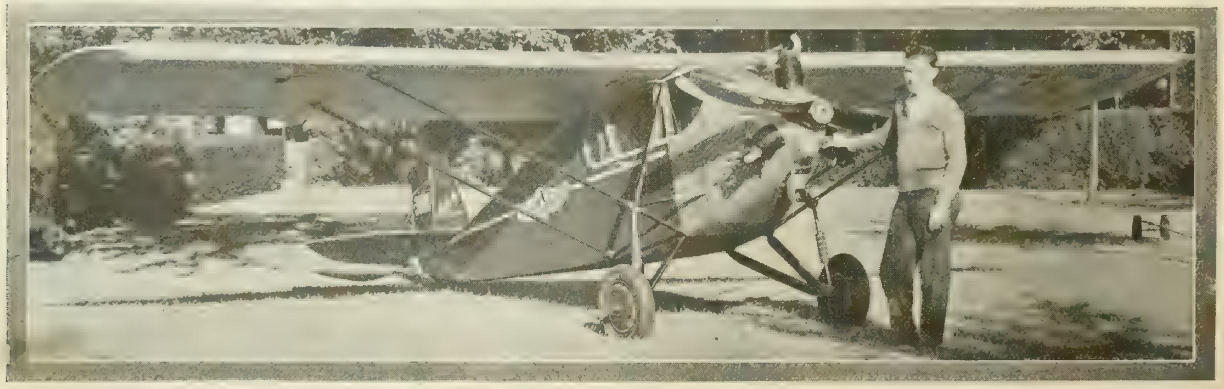
Airplane-propelling mechanism. Fred Heidbraeder, Quincy, Ill. (No. 1,741,517).

Vacuum wing stabilizer for aeroplanes. James G. Lyons, Stockton, Cal. (No. 1,741,578).

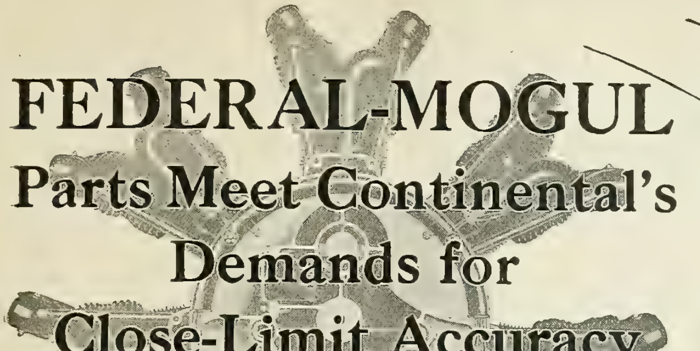
Aeroplane. Salvatore Dolcimascolo, Brooklyn, N. Y. (No. 1,741,617).

Dirigible airship. Lorrin L. Hansen, Wasta, S. Dak. (No. 1,741,699).

Aeroplane landing-gear arm. Spiros S. Varkas, New York, N. Y. (No. 1,741,964).



The Baby Ace single-place cabin plane weighs only 800 pounds loaded; with a Szekely engine its high speed is 85 m.p.h.



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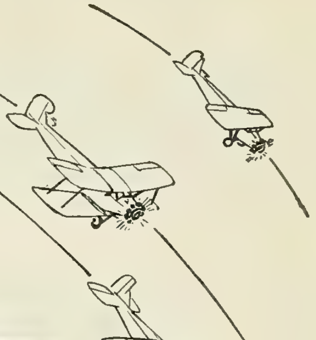

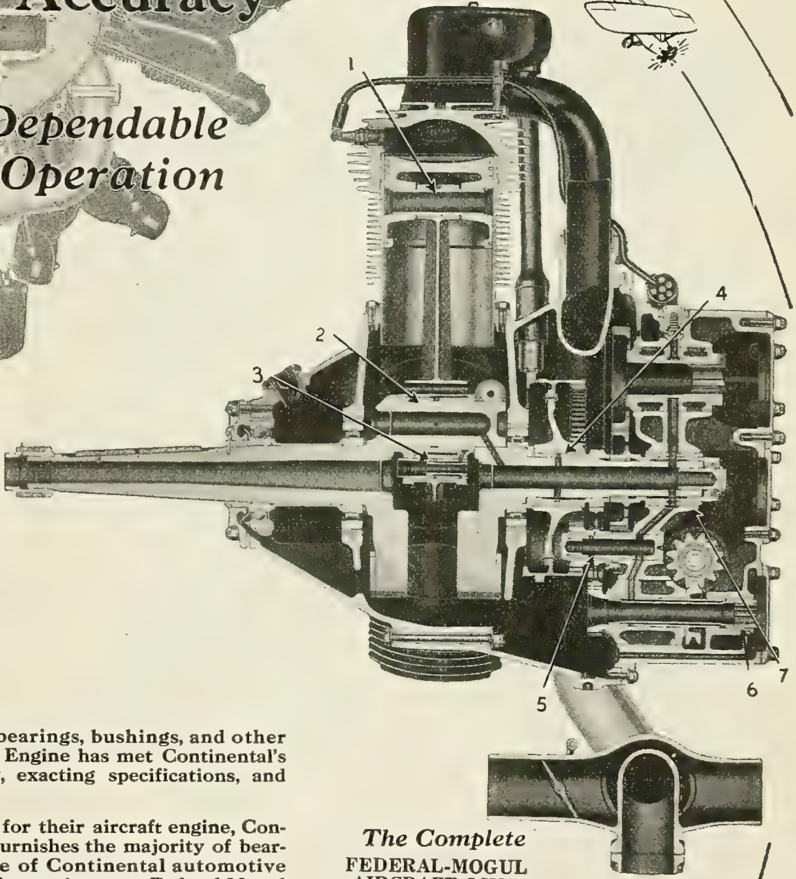

Federal-Mogul

Aircraft Engine Parts furnished Continental

1—Piston Pin Bushing
2—Master Rod Bushing
3—Knuckle Pin Bushing
4—Cam Hub Bushing
5—Cam Drive Gear Bushings
6—Generator Drive Shaft Bushing
7—Crank Shaft Oil Feed Bushing

(*not showing on illustration*)
Valve Guide, Intake Valve Guide, and Ignition Drive Shaft Bushing

The selection of Federal-Mogul bearings, bushings, and other parts for the new Continental Aircraft Engine has met Continental's high standards of close-limit accuracy, exacting specifications, and smooth, frictionless performance.

In selecting bearings and bushings for their aircraft engine, Continental went to the same source that furnishes the majority of bearings and bushings for the famous line of Continental automotive engines. They knew from many years' experience as Federal-Mogul Bearing and Bushing users that they deal with positive, known factors. They know that they receive products whose quality and close-limit dimensions are unquestioned—products manufactured by a metallurgical and engineering staff of seasoned experience, with plant facilities second to none.

Other aircraft engine builders too, have been alert to the advantages of Federal-Mogul service—among this ever growing list are Wright, Curtis, American Cirrus, Pratt and Whitney, Le Blond, Szekely, Anzani and others.

Aircraft engine builders today have the same well-grounded opinion that has been firmly held for many years by the automotive industry—that Federal-Mogul products are of unquestioned reliability.

Choose an absolutely dependable source of supply. Rely upon Federal-Mogul—backed by thirty years of specialized experience.

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Bronze Bushings-Bronze Washers
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Bronze Cored and Solid Bars
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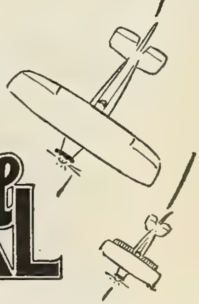


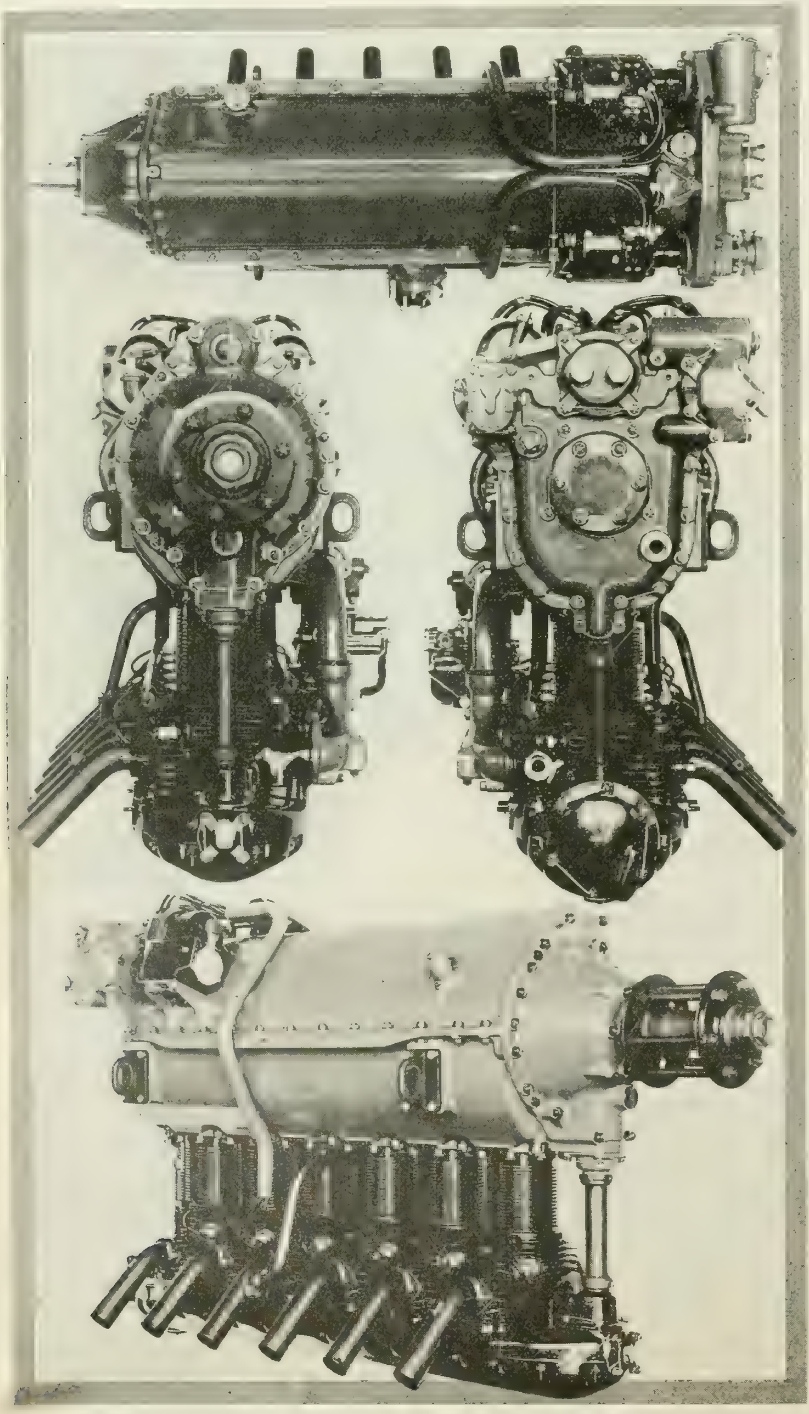
Mogul FEDERAL

FEDERAL-MOGUL CORPORATION—DETROIT, MICHIGAN

NEW FAIRCHILD IN-LINE ENGINE

WITH the effect of rounding out its function as a supply to aviation in general, the Fairchild Aviation Corporation will, at an early date, begin production of airplane engines. These engines will represent a careful refinement and development of proved type rather than an effort to merchandise radically new principles of design.

The engines are to be manufactured by the Fairchild Engine Corporation, a subsidiary of the Fairchild Aviation Corporation, in its plant at Farmingdale, N. Y. For a considerable time this plant has been engaged in the manufacture of aircraft engine parts and has been largely responsible for the fabrication of engines ranging from 90 to 500 horsepower.



Views of the 110-horsepower Fairchild inverted in-line aircraft engine

Thus, with the facilities of a shop personnel specially trained in the production of aircraft engines; a factory of 22,500 square feet of floor space, fully equipped with modern machine tools, and four up-to-date engine test houses, the Fairchild corporation is in an excellent position to manufacture a line of engines in its own name.

The subsidiary organization is headed by Mr. Walter F. Davis, chief engineer, who has gathered about him a group of men whose experience in the design and production of aircraft engines ranges over periods of from eight to twelve years and who have played considerable parts in the development of some of the outstandingly successful engines produced in this country during the past five years.

This organization began to function as such on May 1st, 1929.

Project studies of the current model engine were begun June 1st; the forging drawing released on August 1st and orders for casting followed August 6th.

The completed first engine was mounted on the belting-in stand on November 18—five months and eighteen days from the first drawing, the engine was run on its test stand under its own power.

Then began a series of tests which culminated on December 16 with the highly satisfactory completion of a fifty-hour, non-stop run at nine-tenths full load and at full throttle alternately. This run was made rather impromptu and to determine as soon as possible the mechanical performance of component parts.

The average power developed during this test exceeded by two per cent the rated horsepower of the engine.

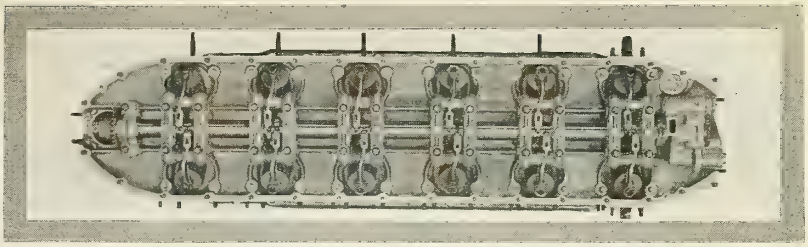
The schedule of the run was in accordance with Air Service specifications for non-stop tests of this duration but was not under military supervision.

It is noteworthy that, at the end of this fifty-hour run, the engine was developing three horsepower more than during the first few hours.

A detailed inspection was made while the engine was disassembled and the wear on all major working parts was found to be barely measurable.

Preparations are being made for the installation of several of these engines in airplanes now in production at the Fairchild plant, and flight tests will be conducted shortly.

From the viewpoints of aerodynamically clean airplane design, appearance of engine installed and vision from pilot's cockpit, the in-line inverted type engine leaves little to be desired. The frontal projected area of the Fairchild engine is 2.8 square feet, whereas a radial engine of the same displacement offers 7.06 square feet. With this engine installed in an airplane, the unobstructed vision forward will be appreciated from the fact that the highest point on the engine, at its rear, is less than 10 inches above the center line of the crank-



View from below, showing Fairchild engine cam shaft and rocker mechanism

shaft, or about 7½ inches higher than the top of propeller hub flange.

The crankshaft is of conventional design, with starter driving jaws machined at the rear end and all lightening holes are closed with easily removable plugs. This permits the functioning of the unit as a centrifugal oil cleaner.

Main and connecting rod large end bearings are of babbitted bronze. Connecting rods are of H section, bronze bushed at piston end.

The pistons have three rings above the full-floating piston pin and a scraper ring at the bottom of the skirt.

The crankcase is of semi-eliptical cross section, parting on crankshaft center-line. Its upper half carries two long studs at each of the seven main bearings, which extend through the lower half of the case.

On the sides of the case are four finished pads for mounting the engine. The forward pair are located on a line between cylinders 5 and 6 and the rear pair at the extreme end of the case. Each pad is tapped for four studs which secure forged aluminum mounting feet which are supplied with the engine.

Near the top of the upper crankcase and located in the main bearing webs, are the bearings of the accessory drive shaft.

Both ends of the crankcase are faced; the front, to take a nose section which carries the propeller thrust bearing and which serves as a cover for gears driving camshaft and accessory drive shaft, and the rear to match up with a shallow rear section described later.

The cylinder construction is conventional, consisting of a steel barrel threaded into a head of cast aluminum alloy. Eight studs through the integral flange secure the barrel to the crankcase.

The combustion chamber is spherically machined and two spark plugs enter angularly to the plane of the valves but not radially to cylinder center-line.

The two ports are set at 90 degrees to the crankshaft and vertically faced off. The exhaust flange carries two studs and the intake one stud and one bolt.

The valves are set in the cylinder head at an included angle of 60 degrees; they seat upon inserts of aluminum-bronze which are a shrink fit in the cylinder head, as are also the spark plug bushings and valve guides. The guides are of bronze.

Each port carries a faced pad which is machined parallel to the cylinder hold-down flange and fitted with four studs for securing the camshaft housing.

The valve gear is of the usually-called overhead camshaft type, but since this engine is an inverted type, the term "underhead camshaft" is more appropriately descriptive.

Valves are seated by two concentric springs, secured by split conical locking pieces which fit the top spring washer. Safety snap rings on valve stems prevent the dropping of valves into the cylinder during disassembly.

Camshaft and rockers are supported and enclosed by a housing, the cover of which serves as the engine oil sump. The housing is open at each valve port pad, where it is sealed by the take-up of four studs on the ports.

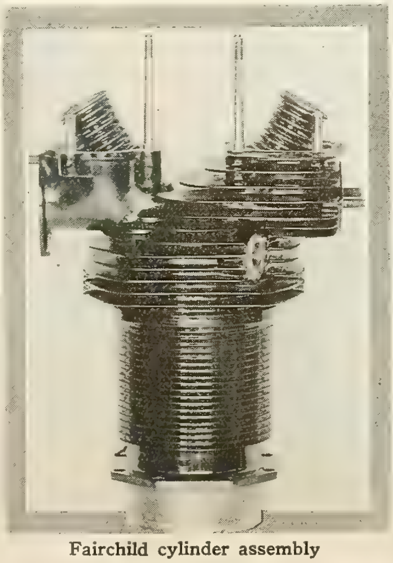
The camshaft has a bearing at each cylinder, one half of which is in the camshaft housing and the other half in an aluminum bridge piece secured by two studs to the camshaft housing. This bridge piece together with a similar one adjacent to it, also support the fulcrum pins of the valve rockers; the latter bridge piece has clearance over the camshaft.

Valve rockers have roller contact with the cams and flatted balls in adjusting screws at the opposite ends minimize side thrust on valve stems.

The camshaft drive consists of a vertical shaft, bevel geared to it; this being driven by a bevel and spur gear idler which is in turn driven by a spur gear on the crankshaft.

Cam timing is provided for at bevel gear set at the camshaft. The gear on the vertical shaft is movable vertically to unmesh with the camshaft gear which is splined to the camshaft. The number of splines is so related to the number of teeth in the gear, that cams may be timed within 1.2 degrees to any desired position of crankshaft.

The intake system comprises two three-port cast manifolds, downward-fed from two steel tube elbows which make up with a tee casting above the carburetor. This tee is jacketed and fed with exhaust gas, acting as a hot-spot in the system. A single venturi Stromberg carburetor is standard equipment.



Fairchild cylinder assembly

Through a single opening about 12 by 16 inches in the airplane cowl over the engine, all accessories, as well as starter and generator connections, oil pressure relief valve and tachometer drive connections, are readily accessible.

The carburetor controls are at the left side at the fore and aft center of the engine.

Two Scintilla magnetos are mounted on inclined brackets at top and near the rear end of the upper crankcase. Toothed type flexible couplings provide means of magneto timing. Ignition wiring is contained in fixed conduits to within six inches of distributors.

None of the accessories are driven from the rear end of the crankshaft.

A shallow rear section which closes the rear end of the crankcase serves as mounting for the pressure oil pump, and in it is located the oil screen. The pressure regulating relief valve is in the pump casting and projects outward and downward at the extreme right side of engine rear; adjacent to it is a removable finger-type oil screen for inlet to pump. On vertically machined pads at the rear of this section are mounted a standard Air Service fuel pump, a two connection tachometer drive, generator and starters as desired. The oil inlet connection is also made here.

A tubular oil duct of generous size drains oil from accessory drive gears in the rear section to the rear end of the camshaft housing.

The oiling system operates at a pressure of about sixty pounds per square inch, supplied by a two-gear pump. The main oil screen is on the pressure side of the pump and from it the oil is led to the rearmost accessory drive shaft bearing. This shaft is hollow and drilled at each of its bearings which are relieved in line with the oil holes in the shaft, and which supply the main bearings by holes drilled in the crankcase webs. Oil holes in all crank webs permit feed to crankpins from two main bearings.

The oil hole to the rear main bearing is tapped by other drilled holes in the crankcase web which supply oil by pressure to accessory gear shafts in the rear section. The bearings of the two idlers in the nose section are similarly supplied, as is also the upper bearing of the vertical shaft. This shaft being hollow, oil is forced through it to its lower bearing and there led from a relief in the bearing to the

(Continued on next page)

(Continued from preceding page)

front camshaft bearing.

The hollow camshaft supplies its own bearings with pressure oil and sprays the valve rockers with oil from small holes drilled between each pair of cams. Return oil in the nose section flows down inside of the tubular housing about the vertical shaft, to the cover of the camshaft housing which acts as the engine sump.

The rear section is drained in same manner by a large tube to the camshaft housing.

At the rear end of the camshaft housing is a three-gear scavenging pump, driven directly from the end of the camshaft. One pair of its gears takes oil from the rear end of the sump by means of an extension from the pump body, and the other set draws oil from the front end of the sump through a steel tube lying close to the bottom of same.

Cored passages from the discharge sides of the scavenging pump lead the oil around a thermometer bulb and out to a hose connection at the top and extreme rear end of the camshaft housing.

The scavenging pump may be removed from the engine by first removing a cover plate at the back end of the camshaft housing.

Two small breathers are located at either end of the crankcase at the top.

Production engines will be supplied with an air-gathering cowl on the right hand (exhaust) side of cylinders to insure air supply under any condition of airplane installation.

Considerable heat from the cylinders is led off through the camshaft housing, bolting up directly, as it does, to the valve ports. This heat is dissipated by approximately 1.33 square feet of its top surface, which is in direct air flow from the cowl.

The problem of mount design is simple because of the general compactness of the accessory group and position of mounting pads.

Provision for taking the torque of the engine by the mount is offered by way of a finished pad with two studs on the sides of the camshaft housing near the rear end.

As determined from results of a fifty-hour test, the oil consumption is approximately .008 pounds per horsepower per hour. This rate will be voluntarily increased in production engines. Fuel consumption rate as recorded at same run is .560 lbs. per horsepower per hour.

Specifications

Number of cylinders	6
Bore	3.937 inches
Stroke	5.125 inches
Displacement	374. 4 cubic inches
Rated power at 2,000 r.p.m.	110 horsepower
Designed maximum power at 2,100 r.p.m.	122 horsepower
Weight, dry, without exhaust stocks or propeller hub	325 pounds

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SWEDISH FIGHTING PLANE

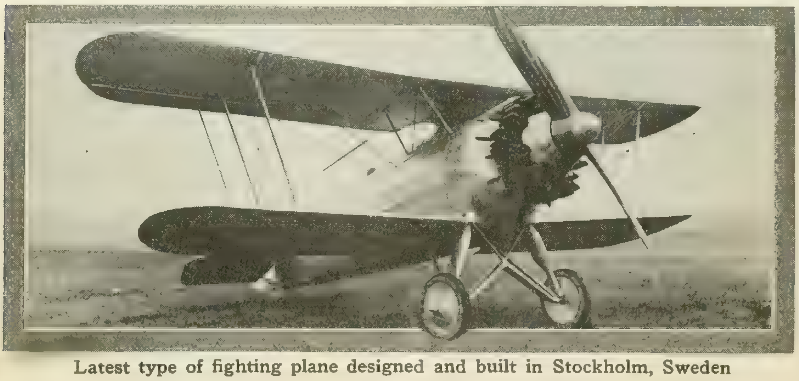
ONE of the most recent products of Svenska Aero A.B. Flygmaskinsfabrik, Stockholm, Sweden, is a single-place fighting plane powered with a 500-horsepower geared Armstrong Siddely Jaguar engine with supercharger. The machine is equipped with flight instruments and two fixed machine guns firing through the propeller.

The fuselage is constructed of welded steel tubing and covered with fabric. The wings are fabric covered and wing spars are of rectangular steel tubes. The wing ribs are constructed of wood or steel as desired by the purchaser.

Tests conducted by the Svenska Aero A. B. have shown a high factor of maneuverability and controllability, according to the company's report. The plane climbs rapidly, has a ceiling of over 30,000 feet, and climbs to 16,000 feet in nine minutes.

Specifications

Wing span	29.5 feet
Wing area	236.7 square feet
Height overall	11 feet
Length overall	23 feet
Weight empty	1,929 pounds
Total weight	3,032 pounds
Useful load	1,102.5 pounds
Wing loading	12.7 pounds per sq. ft.
Power loading	6.6 pounds per horsepower
Absolute ceiling	31,000 feet
Climb to 16,000 feet	9 minutes
Landing speed	55 miles per hour
Landing run	460 feet
Take-off run	164 feet



Latest type of fighting plane designed and built in Stockholm, Sweden

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TORSIONAL STRENGTH OF AIRPLANE WINGS

(Synopsis of N. A. C. A. Report No. 329)

THIS report was submitted to the National Advisory Committee for Aeronautics by the Bureau of Aeronautics, Navy Department. It describes a simple method for calculating the position of the elastic axis of a wing structure having any number of spars. It is shown that strong drag bracing near the top and bottom of a wing greatly increases the torsional strength. An analytical procedure for finding the contribution of the drag bracing to the torcional strength and stiffness is described, based upon the principle of least work.

The validity of the new method of analysis is tested by applying it to a two-fifths scale model of the large steel tubular three-spar wing of the Huff-Daland XHB monoplane. The calculated stresses are checked by comparison with the strains observed by means of electric telemeter strain gauges secured to the spars during sand load tests in the static testing laboratory of the Army Corps Engineering Division at Dayton.

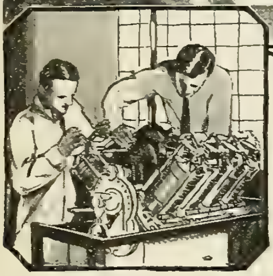
The torsional strength of a wing determines very largely the distribution of air forces upon it, and the tendency to flutter. Insufficient torsional strength produces wash-in or an increasing angle of attack toward the wing tips in the high incidence condition, further increasing the load on the front spar in the condition which is already the most severe. Conversely, torsional yielding in the low incidence and nose dive conditions produces washout of the wing shape and may exaggerate the critical condition for the rear spar.

The mathematical theory of the forces producing flutter is not yet sufficiently far advanced to determine by direct calculation the critical air speed at which flutter will commence. Comparison with successful practice must still be the principal criterion upon which to judge the adequacy of the torsional strength of a new design of wing. Obviously this comparison will be greatly facilitated by use of a coefficient of torsional rigidity including the principal factors in torsional strength. A coefficient for comparing the torsional rigidity of different wings is derived in this report.

Report No. 329, by C. P. Burgess, may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

BEARING DATA BOOKLET

A loose-leaf booklet containing data sheets has been prepared and circulated by the Fafnir Bearing Company of New Britain, Conn., manufacturers of ball bearings for aircraft. Each sheet contains illustrations, specifications and general data on one of the company's products, and the dates of issue are shown on each separate sheet. The sheets are contained in a heavy cardboard loose leaf folder. The Fafnir company manufactures and distributes ball bearings designed for aircraft engines, controls, landing wheels, instruments, radio generators and alternators, controllable pitch propellers, and rotating beacons.



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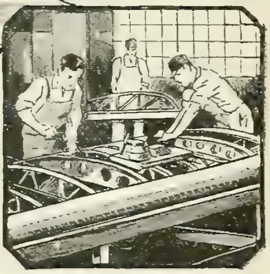

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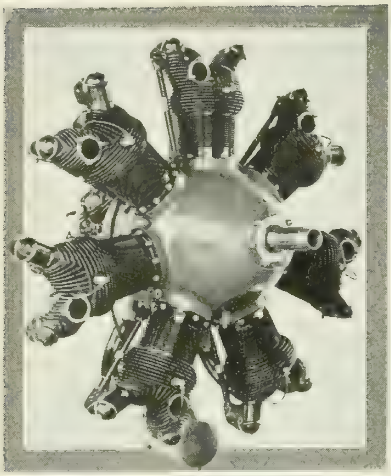


300-horsepower Apache engine

BOHNALITE IN THE APACHE ENGINE

FOR some time the aircraft engineers of the Bohn Aluminum and Brass Corporation, Detroit, have advocated the use of lighter alloys for engine construction. Bohnalite X, which they introduced for aeronautical purposes, is a light alloy which is thirty-six per cent lighter than aluminum and seventy-eight per cent lighter than iron. It is furnished in castings, forgings and extruded shapes.

The Apache 200-horsepower and 300-horsepower seven-cylinder radial engines are examples of aircraft practice in which Bohnalite X is used. The Apache 300-horsepower engine is more than thirty-five pounds lighter than it would have been had it employed aluminum castings, according to Bohn officials.

Additional endurance performance is expected as a result of the use of Bohnalite X castings, which allow sturdy construction without increasing weight.

This light alloy is also particularly suitable for tail wheels, landing wheel hubs, cabin fittings and control parts.

The Bohn organization made the patterns as well as the three crankcase castings for the Apache engine. The pistons of the engine are made of Bohnalite; the bearings are Bohn Ring True product; the valve seats and the valve stem guide are made of Bohnalloy.

PONTOONS FOR FORD TRIMOTOR

WHAT is reported to be the largest pair of pontoons ever built was delivered recently by Aircraft Products Corporation, Detroit, to the Stout Metal Airplane Company, division of the Ford Motor Company.

The floats will be used on a Ford trimotor and are designed to support a total load of 27,000 pounds. They are thirty-two (32) feet long, and each one weighs 600 pounds. Into each float is built a special compartment for storing an anchor. They are the first products of the company's new pontoon and ski division.

Designed by A. Ralston Stalb, head of the new department, the floats are not a radical departure from orthodox designs. They do, however, carry out known principles to an unusual degree. For instance, the floats have an unusually efficient streamline. Stalb estimates that a plane equipped with these floats will sacrifice little if any of its performance.

CARBURETOR AIR HEATER-CLEANER

ENGINEERS of Western Air Express have recently invented a simple device consisting of two flexible pipes and a housing for the carburetor, which eliminates two obstacles in the operation of airplane power plants in cold weather. The position of the air vent which is normally below the engine, where dust and dirt stirred up by the wheels of a taxying plane is sucked into the blower, has been changed to the top of the motor, just below the wings. Two flexible pipes lead from the carburetor housing to a stove attachment on the exhaust pipe which heats the inrushing air ten degrees. Hot air, instead of the normal cold air, is then mixed with gasoline vapor in the carburetor. The entire mixture of gasoline vapor and air goes into the blower at about forty degrees Fahrenheit.

Inspection of engines after the device has been attached reveals that working parts are in much better condition. It is estimated that the device will add 500 hours to the total life of the motors, inasmuch as dust in the air is largely responsible for friction of working parts.

In warm weather the pipes can be disconnected from the exhaust stove in twenty minutes. The air will still be clean because it comes from the top of the engine.

Formerly ice formed around the opening of the carburetor vent which partially closed the opening restricting air from entering to mix with the gasoline vapor. This is another obstacle eliminated.

AIRPLANE CHAIR OF LIGHT WEIGHT

A NEW type of airplane chair, weighing twelve pounds, has been placed on the market by the Associated Products Division of the J. G. Brill Company, Philadelphia.

Brill light weight airplane chair

Since the element of personal comfort has an important bearing in the selection of equipment of the traveling public, the "deck-chair" type of design was adopted in order to provide the utmost in comfort. This new chair is constructed principally of heat-treated, ¾-inch aluminum alloy tubing, which accounts for its light weight. To this framework is attached a one-piece leather cushion support and back. The cushion and head-rest are padded and upholstered. The absence of any operating mechanism assures long life for this chair.

TESTS OF VICTOR TRAINING PLANE

THE Victor training plane, which was given its initial test flight by Mrs. Keith Miller at Mount Holly, N. J., is the first ship to be completed by the Victor Aircraft Company. The ship is a two-place open-cockpit biplane designed for training purposes. It was the company's intention to have Mrs. Keith Miller merely test the motor by taxying the plane over the field. First runs went so well that, without announcing her plans, she took it into the air several times successfully and put it through a series of maneuvers. Following these flights, the plane was taken up by Capt. W. Newton Lancaster.

The Victor training plane, designed by Felix Knoll, is powered with an American Cirrus 90-horsepower engine and has a wing span of thirty feet. Top speed of the ship is ninety-seven miles per hour, landing speed thirty-five to thirty-seven miles. On completion of further tests the plane will be taken by Mrs. Keith Miller on a tour of the larger Eastern airports.

View showing comparative size of one of the pontoons for the Ford trimotor

$100,000 SAFETY PRIZE WINNER

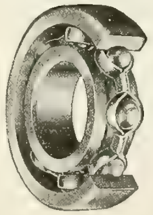
Controlled

with the aid of FAFNIRS

SAFETY to a degree that makes a plane practically "foolproof" was the basis of the Guggenheim award to the Curtiss Tanager. Slotted wings and the so-called "floating" aileron were outstanding features, but every detail was designed to contribute its share towards safety.

The advanced Control system which triumphed in this competition presupposed the use of ball bearings. Control pulleys, for instance, were mounted on Fafnirs to give that sensitive reliability essential in the more difficult tests.

Curtiss, appreciating the value of the Ball Bearing design, uses Fafnirs in other applications in other ships, other models. Fafnir Ball Bearings are made for every aircraft application. Send for special data sheets.



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THE AIR SERVICES

1931 AIR CORPS APPROPRIATION

THE War Department appropriation bill for the fiscal year of 1931 was presented to the House of Representatives on January 6, carrying a total of $455,031,386 for military and non-military activities, and including an appropriation of $72,833,883 for the Army Air Corps. The War Department appropriation bill for the fiscal year 1930 included the sum of $67,579,358 for the Air Corps. More than twenty per cent of the items in the bill for military activities have been appropriated to the Air Corps.

For heavier-than-air craft activities of the Army Air Corps, the War Department appropriation bill provides for the procurement of 443 airplanes; 27 are provided for the National Guard air service, the cost of these planes to be accredited to the funds of that organization. According to the bill, the Air Corps had on hand and on order on June 30, 1929, a total of 1,457 planes. Procurements for 1930 are to number 352, and procurements for 1931 will amount to 470, making a total in all of 2,279 planes. Estimated losses during 1930 are 261, and in the following year, 407. The predicted status, planes on hand and on order June 30, 1930, will be, according to this estimate, 1,611.

The 1931 procurements of the Army Air Corps represent the fourth increment of the Five Year Building Program, which calls for a total of 1,800 airplanes upon its accomplishment. The bill as presented to the House provides for the full fourth year increment. The prediction is made in the bill that at the end of 1931 the number of planes on hand will exceed the procurement schedule, but that there will be a shortage of various types of planes as follows: seven bombardment planes, five attack planes, 24 observation and 20 transport ships.

No augmentation of the fleet of lighter-than-air craft of the Army Air Corps was included in the appropriation bill for the fiscal year 1930. For the fiscal year 1931, the bill includes $78,450 for the purchase of one non-rigid airship and envelop, one observation balloon, four barrage balloons, and accessories for lighter-than-air craft. The bill provides approximately $200,000 for all lighter-than-air activities, including purchase, maintenance and operation. The Air Corps had on hand on June 30, 1929, 16 non-rigid airships, and 26 envelops, 40 spherical balloons and 28 observation balloons. All of this equipment is not, however, in serviceable condition.

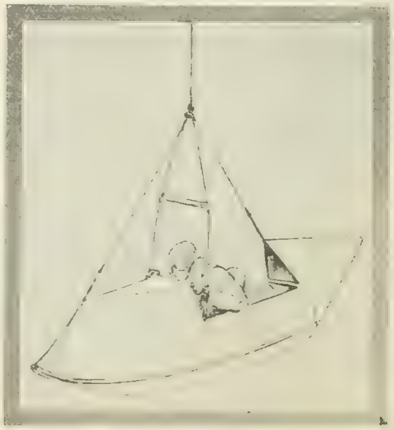
There is no provision made in the bill for the purchase of helium. It was reported that the supply on hand, in addition to purchases made during the current year, will take care of the Air Corps' requirement for helium up to and including the fiscal year 1931, requiring no further provision until 1932.

The bill includes $3,010,218 for construction work at fields of the Air Corps, including the development of landing fields. This sum is in furtherance of the technical construction program which has been estimated to cost $27,000,000, of which $9,181,315 has been appropriated. In addition, the sum of $85,000 is provided for the improvement of the landing field at Langley Field, Va., and $300,000 for continuing the establishment of the materiel division at Wright Field, Dayton, Ohio.

According to the provisions of the appropriation bill, all vacancies in the Air Corps will be filled by West Point graduates and flying cadet graduates. Pointing out that the cadet graduates cannot be commissioned until an accelerated rate of attrition occurs in the regular commissioned personnel, the bill provides as an alternative the employment of a larger number of such potential flying officer personnel as Reserve officer pilots on extended details, than would otherwise be necessary. Enlisted personnel in the Air Corps will be supplied when required by transfer from other branches of the Army.

SUB-CLOUD OBSERVATION CAR TESTED

EXPERIMENTS on a sub-cloud observation car, in which an observation car and observer were suspended from a dirigible in flight, were conducted recently by the Materiel Division, Wright Field, Dayton, Ohio. The device was designed to permit an airship to remain above the clouds, while the observer suspended below the ship directs the flight or takes observations. Such a car was successfully used by the Germans on Zeppelin bombing raids during the war. The Materiel Division plans to develop this arrangement not only for bombing operations in time of war, but for assisting all types of dirigibles to land in fog in commercial operations or peace-time military maneuvers.


Drawing of sub-cloud observation car

The car is suspended below the airship by a windlass and cable which holds a telephone cord by means of which communication is maintained with the airship's crew through a voice telephone. At the present time the ordinary type of telephone system used on captive balloons is utilized, the observer at all times having his head-set attached and reporting direct to the pilot of the airship. A mechanical signal device for emergencies is installed also. A tendency of the car to revolve after being lowered was overcome in the tests by the design of the rear end of the car which was such as to act automatically as a rudder.

MANLY AND BYRD RECEIVE LANGLEY AERODROMIC MEDAL

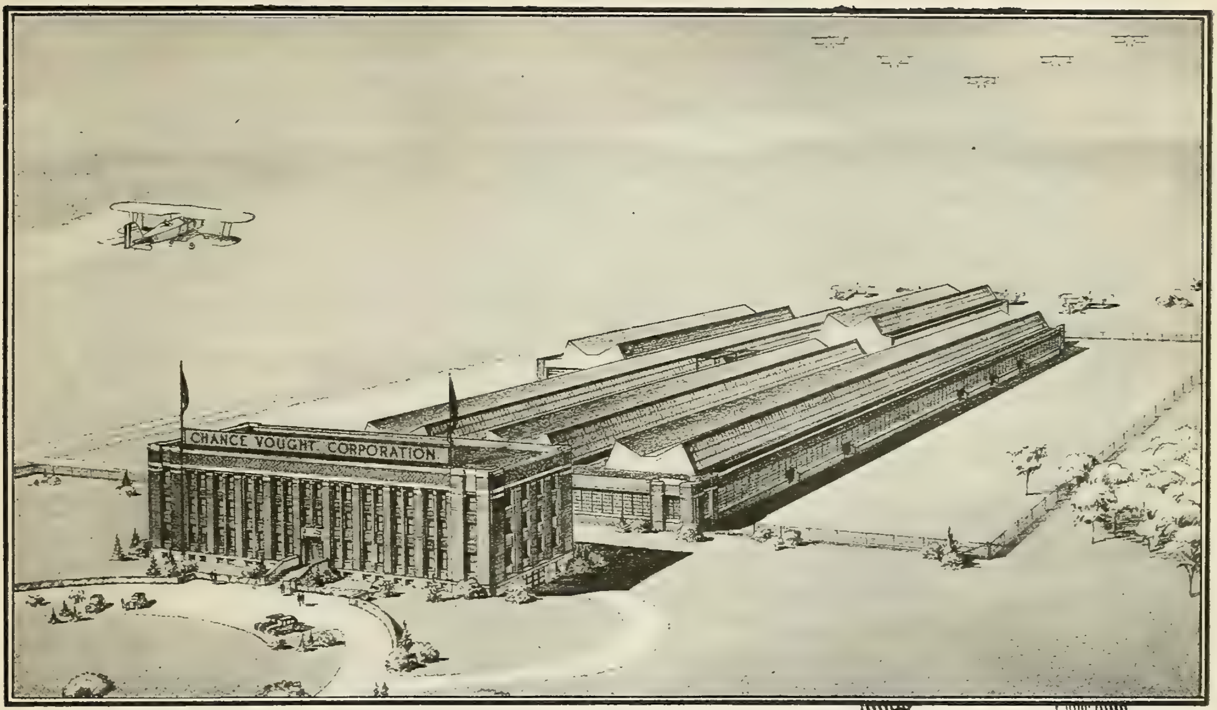
THE Langley Medal for Aerodromics, emblematic of scientific contribution to the advancement of aviation, was awarded to Rear Admiral Richard E. Byrd and, posthumously, to Charles Mathews Manly at the recent annual meeting of the board of regents of the Smithsonian Institution. William Howard Taft, chancellor of the board, presided over the meeting at which the awards were granted.

The award was made to Rear Admiral Byrd for his successful employment of the airplane to explore the North and South Poles, for his transatlantic flight and for scientific achievements associated therewith: and to the late Charles Manly in recognition of his pioneering work in the development of the airplane engine.

The Langley Medal for Aerodromics was established in 1909 to be awarded to those who, in the opinion of the members of the board of regents of the Smithsonian Institution, contribute to the science and art of aviation. The medal was first awarded to Wilbur and Orville Wright in 1909; it was awarded to Glenn H. Curtiss and Gustave Eiffel in 1913; and to Col. Charles A. Lindbergh in 1927.

Rear Admiral Byrd was recently advanced by the United States Navy from the grade of Commander to that of Rear Admiral in recognition of his exploration of the Antarctic region. President Hoover signed the bill making this advancement effective on December 21.

THE War Department recently announced that vacancies in various units of the Procurement Service are available to Reserve officers, these vacancies to be filled by men who will receive basic training during peace time in the purchasing of supplies for the Army.



A new home for the "Corsair"

THIS month an engineering ideal comes to life. For years executives and engineers of the Chance Vought Corporation have dreamed of a perfect industrial home, housing equipment for research, development and manufacture. These plans have materialized and the Vought staff is established in a plant which is perhaps unequalled in equipment and layout for the design and construction of the famous Vought products.

In this new home a new series of "Corsairs" is starting down the long assembly lines, parts are coming off the brand new machines and soon planes will begin to appear on the airport at the rear of the plant and take to their wings.

This new home is a monument of steel and brick to Vought traditions and is dedicated to carrying on Vought ideals of quality and craftsmanship. It is a practical testimony to the permanence and stability of a great industry, of which this company is proud to be a part.

CHANCE VOUGHT CORPORATION

DIVISION OF UNITED AIRCRAFT & TRANSPORT CORPORATION

Hartford, Connecticut

WINTER CROSS-COUNTRY FLIGHT OF FIRST PURSUIT GROUP

By T. R. Langley

PURPOSELY operating under difficult conditions of temperature, and over a course practically unchartered for air travel, a detachment of twenty-two planes of the First Pursuit Group undertook a 6,000-mile flight from Selfridge Field, Michigan, to Spokane, Washington, and return during January to test personnel and equipment under simulated battle conditions. The winter mission has been characterized by Army officers as one of the most hazardous flights ever attempted in peace time.

The planes of the fleet that took off from Selfridge Field under the command of Maj. Ralph Royce on January 10 were equipped with skis instead of the regular landing gear for landing and taking off on snow and ice. Several were powered with air-cooled engines and the rest were equipped with water-cooled power plants. Four ships reached the half-way mark at Newman Lake near Spokane on January 17, after a flight from Kalispell, Montana. Thirteen other planes reached Newman Lake on January 19 after a flight from Great Falls, Montana, where they had been delayed several days by high winds and a temperature of more than forty degrees below zero. Five other ships were delayed at points east of Spokane.

A major purpose of the expedition was to test the value of short wave radio as a means of contact between military planes operated in isolated regions. For the first time in history a large detachment of airplanes performed mimic warfare maneuvers over a 3,000-mile front, and for the first time the general public was permitted to follow closely the progress of Army Air Corps planes on an official flight across the continent. In the organization of the flight, provision was made for a total of nine days in the air from Selfridge Field to Spokane and return, with stops scheduled throughout the journey at St. Ignace, Duluth, Grand Forks, Minot, Glasgow, Great Falls, and Kalispell on the westward flight; and at Helena, Miles City, Bismarck, Fargo, Minneapolis, Wausau, and Escanaba on the eastbound journey back to Selfridge Field.

Difficulties resulting from severe weather were encountered when the flight took off at Selfridge Field on the first leg of the journey. Two planes were frozen in the ice and, with two that developed engine trouble, were unable to start the flight on schedule. The flight followed the schedule as far as Minot, where seventeen ships arrived on January 11. Five planes were forced down at various points in Michigan, Minnesota and North Dakota by engine trouble and accidents to skis made in landing.

Difficulties encountered as a result of the extreme cold and the unmapped territory were such as to give important data on the performance of an aerial mission under the worst possible conditions. At the points where over-night stops had been arranged no hangar facilities had been provided, the ships remaining unprotected on the ice and snow. The engines were warmed up the morning following each stop, landing gear, wings and fuselage being chopped free of the ice which had collected during the night. The comparative performance of air-cooled and water-cooled engines was carefully noted. Considerable data on the present possibilities for operation of a fleet of planes under extreme conditions from a military and commercial standpoint is expected to result from the expedition.

There was a delay of one day at Minot as the result of severe weather and mechanical trouble. On January 13 a fleet of twenty planes left Minot for Great Falls. As a result of the difficult flight conditions, January 17 found the twenty-two planes of the detachment scattered over a 1,300-mile storm-bound area. Four planes were at Newman Lake where they landed after negotiating the flight over the Continental Divide ahead of the severest storm encountered on the journey; thirteen planes were at Great Falls where they had been delayed since their arrival since January 13; and four planes were delayed east of Great Falls. On January 19, the thirteen planes at Great Falls took off for Newman Lake and landed there after a flight through high winds and snow. With seventeen of the twenty-two planes which started at Selfridge Field completing half of the flight, one of the objects of the flight had been carried out—"to see how many planes could get through."

The following are included in the personnel of the flight: Maj. Ralph Royce, commanding officer; Lieut. Harry A. Johnson, engineering officer; Lieut. Paul W. Wolf, adjutant; Lieut. Alden R. Crawford, operations officer; Lieut. Aubrey L. Moore, supply officer, and Lieuts. James E. Duke, Cecil E. Henry, Charles A. Harrington, Ernest K. Warburton, Paul B. Wurstsmith, Homer L. Sanders, Max H. Warren, Ralph C. Rhudy, Edward H. Underhill, Austin Straubel, Donald L. Putt, William Bolen, Norman D. Sillin, Paul E. Shanahan, and Paul M. Jacobs, pilots.

Safety precautions including parachutes, signal flares and emergency rations were carried on the flight. In addition, a system of radio communication was organized as a source of relief in the event that forced landings should be made by any of the planes on the mission. An Army transport plane equipped with radio sending and receiving apparatus was assigned to the flight; it started each day with the planes, followed the same route behind them and kept a lookout for planes forced to land. In the event that a plane was sighted in difficulties on the ground the radio plane located the exact position of the disabled craft and broadcast calls for help.

The system of radio communication organized included constant communication during flight hours with the Army Signal Corps through stations located at Columbus, Ohio, Chicago, Omaha, Neb., Leavensworth, Kans., Fort Sill, Okla., Fort Warren Wyo., Fort Douglas, Utah, and Vancouver Barracks, Wash. All of these stations were in direct communication with the Army message center at Washington, D. C. Regular communication schedules were arranged, beginning at 8:30 o'clock Eastern Standard Time, with members of the American Radio Relay League. This phase of operations included two-way communication between the airplane radio station and station W1MK of the league at Hartford, Conn. Each morning before the take-off of the flight from each over-night stop, communication was arranged with the Schenectady laboratories of the General Electric Company, which arranged to stand by for ten minutes at the beginning of each flight hour for signals.

Boeing 100 Pursuit plane which recently flew over 200 m.p.h. in tests

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Boeing 100 Shows New High Performance

FLIGHT tests of the Boeing Model 100 pursuit plane equipped with a supercharger were recently conducted by Army and Navy officials at Seattle, Wash., and San Diego, Calif. The plane is powered with a 425-horsepower Wasp engine, and is manufactured under Approved Type Certificate No. 133.

(Continued on next page)

U. S. SPECIAL AVIATION PISTON RINGS

used on all epochal flights

FLIGHT RECORDS

1. **Col. Chas. Lindbergh, May 20-21, 1927; non-stop flight from New York to Paris, distance of 3,610 miles.**
2. **Capt. Frank Hawks, June 29, 1929; from New York to Los Angeles and return, distance of 4,960 miles.**
3. **A. Goebel, Aug. 16-17, 1927; Dole Race Prize Winner, from Oakland, Calif., to Honolulu, Hawaii, distance of 2,400 miles.**
4. **Rear Admiral Richard E. Byrd, May 9, 1926; from Spitzenberg, King's Bay, to North Pole and return, distance of 1,200 miles.**
5. **Rear Admiral Richard E. Byrd, Nov. 28-29, 1929; from Little America to South Pole and return, distance of 1,600 miles.**

and many others

ENGINES equipped with U. S. Piston Rings have been vital factors in every trail-blazing flight since Lindbergh's thrilling hop to Paris. From the North Pole to the South, planes flown by Byrd, Chamberlin, Maitland, Goebel, and numerous other famous pilots were powered by engines whose pistons were sealed with U. S. special aviation piston rings.

By meeting the rigorous precision requirements of the aviation industry, U. S. Piston Rings have repeatedly demonstrated their efficiency in increasing compression and reducing oil leakage to the minimum.

U·S·HAMMERED PISTON RING CO·
Paterson New Jersey

Oil Shall Not Pass

(*Continued from preceding page*)

During the recent tests the plane flew in excess of 200 miles per hour and is expected to climb to an altitude of six miles. The ship is designed to engage in tactical maneuvers at an altitude of 25,000 feet. The Boeing Model 100 is a staggered biplane with an upper wing span of thirty feet and an overall length of twenty feet.

Experiments in Launching Glider from Dirigible to Be Made at Lakehurst

PREPARATIONS have been started at the Naval Air Station, Lakehurst, N. J., for an experimental flight of a glider which will be launched from the airship *Los Angeles* while in flight, according to an announcement made on January 15. The flight will be made with the purpose of determining the practicability of getting a man to earth quickly and safely in order to supervise a ground crew in the event of a landing away from the dirigible's base. The experiment will be conducted with a view to replacing the present method of landing with the aid of a parachute, which prevents a landing being made accurately within a given distance on the ground.

The glider will be slung beneath the keel of the *Los Angeles* and cut loose from the ship at an altitude of 3,000 feet. Lieut. Ralph S. Barnaby of the United States Navy, a first class glider pilot, will pilot the glider on the flight, and will use a plane weighing 175 pounds. Following the glider experiment at Lakehurst, another will be made over Washington, D. C.

Improvements Planned for Long Beach Naval Reserve Base

AN APPROPRIATION of $10,000 has been made by the Navy Department for the improvement of the Naval Reserve aviation base at the Municipal Airport, Long Beach, Calif. Plans for the development of facilities for the Naval Air Reserve include the construction of an armory, dispensary, radio station, and additions to hangars and the administration building which will be used as classrooms. Following the appropriation by the Navy Department, the aviation commission of Long Beach announced that it is considering bids for the development and improvement of the airport.

According to present plans the airport would comprise 390 acres of land when completed. Provision is made for four runways 1,520 feet in length, two of which would provide a diagonal short cut from the row of hangars to the take-off circle, with the other two available for landing and taking off under cross-wind conditions. Plans include a turning basin which would accommodate five planes and which would be equipped with a light signal system operated from a tower located on the administration building. Signals given by a dispatcher would indicate to every plane when to take off, stand by or land. The north and south sides of this basin would be connected by parallel east and west runways. There would be two take-off and landing runways, 2,860 feet in length.

ADDITIONAL WEATHER REPORTS FOR NAVY

PRELIMINARY arrangements for the extension of the Navy weather radio stations to include reports from five stations in addition to those now in operation have been completed by the Navy Department. The five new stations will augment the reports of the six which at present broadcast every two hours daily from 7 a. m. to 6 p. m. The present stations include: Naval Air Station, Hampton Roads, Va.; Marine Flying Field, Quantico, Va.; Naval Air Station, Anacostia, D. C.; Naval Aircraft Factory, Philadelphia, Pa.; Naval Air Station, Lakehurst, N. J., and Naval Proving Ground, Dahlgren, Va.

The additional points from which the Navy will receive and broadcast similar reports, according to present plans, are as follows: Urbana, Va.; Princess Ann, Maryland; Dover, Delaware; Cape Hatteras, N. C., and Cape Lookout, N. C. The Navy Department plans to establish at the Naval Air Station, Hampton Roads, Va., bi-hourly reports from Cape Hatteras and Cape Lookout. When received in time, these reports will be included in the Navy broadcast from Hampton Roads.

Lieut. Barnaby Receives Three-Star Button as Glider Pilot

LIEUT. RALPH S. BARNABY of the Bureau of Naval Aeronautics was recently presented with the three-star button awarded to first class glider pilots by the National Glider Association. W. H. Bowlus, president of the Bowlus Sailplane Company of San Diego, Calif., is the only other glider pilot to receive the three-star insignia from the Association. Lieut. Barnaby has also been awarded a first class pilot's certificate and annual sporting license by the Federation Aeronautique Internationale. He is the first American glider pilot to receive this award.

Lieut. Barnaby received the awards from the glider association and the Federation Aeronautique Internationale for a recent glider flight in which he flew several miles down the coast of Cape Cod, and back to the starting point after an intermediate landing.

AIR CORPS RESERVE ASSOCIATION FORMED

THE Air Corps Reserve Association of the United States was organized recently in Dallas, Texas. The association was suggested during the summer training camps held in Dallas last summer. Eight men from Texas, Arizona, Oklahoma and New Mexico were appointed to form the plans for the organization and the following officers were elected: Arthur J. Reinhart, president; Fred Pruter, vice president; J. W. Cantwell, secretary-treasurer; and Joe Neyer, judge advocate. The executive committee comprises Thomas L. Rouse, Clarence E. Page, S. L. Willitts, B. S. Graham, and Paul S. Green.

The national organization, which will hold its first convention in St. Louis during the international air show in February, will have its national headquarters in Dallas, and will be divided into nine corps area organizations, state organizations and local squadrons.

Tests of Ice Formation on Airplanes at Anacostia Naval Air Station

DATA concerning the formation of ice on aircraft was secured by Naval engineers in experiments conducted recently at the Naval Air Station, Anacostia, D. C. The tests included a twenty-minute flight by Lieut. J. G. Storrs in a F6C-4 powered with a Wright Whirlwind engine. A solid layer of ice approximately 1-16 of an inch in thickness formed on the leading edge of the wings and also on the tail surfaces in a rough wavy layer that varied in thickness. All wires and struts were coated in addition to the fuselage and cowling.

During the flight the temperature of the air was between 31 and 32 degrees Fahrenheit. A heavy drizzle was falling and immediately freezing upon contact with the ground when the plane took off. Lieut. Storrs circled the field at an altitude of 800 feet and reported that ice could be seen forming on the plane surfaces. After the ship was in the air for fifteen minutes, an increase of one hundred revolutions per minute was required to maintain the original air-speed and altitude. There was a distinct stiffening of the controls, according to Lieut. Storrs' observations, and an increase noted in the weight of the plane with the formation of ice.

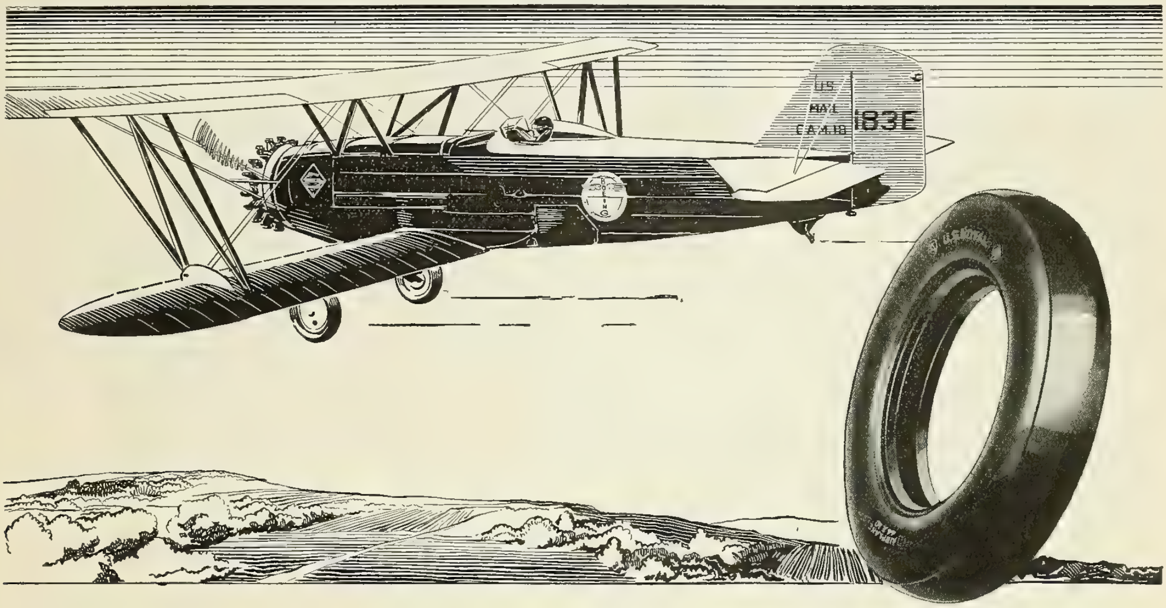
Regulations of Official Flying Time for Naval Officers

THE Bureau of Aeronautics, Navy Department, recently announced regulations on the methods of computing official flying time of Naval aviators. The flying time of duly authorized flights in the line of duty will be included in the official flying time and flights made by Naval aviators in Government planes; flights in commercial planes, when such flights are authorized by the proper authorities and performed in the line of duty, will be considered official. Flights of an unofficial nature made in commercial planes will not count toward the aviator's official flying time.

Aviators' flight log books are provided for official entries of duly authorized flights performed in a duty status. Flying time in lighter-than-air craft should be recorded in the log book separately.

A NEW altitude record of 30,000 feet with a full military load in a P-12 pursuit plane, was recently established by Lieut. Norman Ives of the 95th Pursuit Squadron, Rockwell Field, Calif., according to an announcement of the War Department. The altitude was reached during a series of high altitude tests conducted at Rockwell Field. According to the records of the Chief of the Air Corps, 30,000 feet constitutes a record for this type of plane with full military load. More recently, Lieut. G. E. Price of the same squadron made an altitude of 31,200 feet with a P-12 plane carrying full military load.

Air-Minded for 22 Years



Aviation is no new plaything with the United States Rubber Company. It has been a *business* with U. S. since 1908. The world's *first* airplane tire was the first contribution of U. S. engineers to safer, more economical flying. Since that historic development many U. S. contributions to aviation have followed—larger, tougher tires—then today's Web-Cord tires of still stronger but lighter construction. U. S. offers today's aircraft manufacturers a rubber engineering service that is air-minded by *experience* rather than by fancy. Here you will find competent assistance with any aviation problems in which rubber plays a part.

UNITED STATES RUBBER COMPANY—WORLD'S LARGEST PRODUCER OF RUBBER

U.S.ROYAL AIRPLANE
TIRES

Army-Navy Joint Minor Exercises Announced for 1930

THE Army and Navy will jointly hold five minor exercises during 1930 in which their respective air services will participate, according to a recent announcement of the Secretary of War and the Secretary of the Navy. The exercises will be held both during the day and night and actual war conditions will be simulated as far as is practicable. Simulated air combats between the Army Air Corps and the Naval Air Service will be held during the exercises.

The exercises are scheduled as follows: Panama, February 25 to March 10, with the battle fleet; harbor defenses of Long Island Sound, May, with the scouting fleet; the harbor defenses of San Francisco, Calif., July, with the battle fleet; Philippines, scheduled to be arranged by the Army and Navy commanders concerned, held in conjunction with the Asiatic fleet, and Hawaii, scheduled to be arranged by the Army and Navy commanders concerned, the Naval forces participating being those based at Pearl Harbor.

These exercises will be held for the purpose of testing existing defense projects and plans; of solving problems in the coördination of the action of air, anti-aircraft, and harbor defense forces of the Army in the defense against an attacking fleet; of improving the tactics and technique of the defense arms; and of developing efficient communication and team work among all the elements of the defending forces.

The commanding generals of the Panama Canal, Philippine and Hawaiian departments of the Army, and the First and Ninth Corps Areas will arrange for these exercises with the Naval commanders concerned.

Improvements at Selfridge Field

SELFRIDGE FIELD at Mt. Clemens is assuming a new appearance following the appropriation of $3,000,000 made by the last Congress for new buildings and equipment. Col. Thomas H. Danforth, commandant of the First Pursuit Group, announces that completion of the building program within the next two years will give his command the best equipment available.

Wooden barracks are being replaced with brick quarters, and the technical buildings and hangars are to be of similar construction. Concrete runways are to be laid and a sea wall will forestall the danger of flooding the field by the waters of Lake St. Clair. As the field was formerly a swamp, over $2,000,000 has already been spent on construction to make it suitable for airport use. Originally Selfridge was intended only as a summer training camp, and it was later decided to make it a permanent Army Air Base.

New buildings scheduled for construction include a hangar, field shops, headquarters building, radio building, parachute building, field warehouse, photographic building and structures for the storage of paint, dope, oil and gas. "When the program is completed, Selfridge will be entirely a new field, and modern in every respect," Col. Danforth declared.

Lieut. William A. Matheny

Lieut. Matheny Receives Cheney Award

THE Cheney Award for 1929 has been awarded to Lieut. William A. Matheny of the Army Air Corps, stationed at Langley Field, Va. The award, consisting of a bronze plaque and $500 in cash, is given annually for the performance of the highest act of valor and self sacrifice by a flying officer. The act for which the award was made occurred August 30, 1929, when a bomber which carried Lieut. Matheny, Lieut. D. Canfield, and Sgt. Wright, caught fire in the air on a flight from Managua, Nicaragua, to the Panama Canal Zone. The plane crashed in the jungle and Lieut. Matheny was severely burned when he rescued Lieut. Canfield, whose clothing was afire, and put out the flames.

Improvements at the Army Air Corps Base at Boston

DEVELOPMENTS and improvements of the buildings and equipment which have been completed at the Army Air Corps base at the Boston Airport include the rebuilding and remodeling of two hangars. These buildings have been provided with new metal roofs, and cement and stucco side walls done in Spanish-type gray finish. New quarters have been provided for officers and enlisted men, and a parachute packing room, drop tower, engine shop and supply room have been provided.

Urges Support of Lighter-Than-Air Activities of Scott Field

SCOTT FIELD, at Belleville, Ill., the only inland Army lighter-than-air station in the United States, is an important link in a coördinated national defense plan and should be maintained on a scale commensurate with all branches of the military service as long as the Army continues to maintain lighter-than-air defense, Maj. A. B. Lambert, founder of the St. Louis Municipal Airport, declared in discussing the proposal to eliminate the appropriation for the field. No estimate of expenditures necessary for the continuance of Scott Field is carried in the budget now before Congress, due to the fact that the appropriation for the field was eliminated by the Senate in the last two sessions. The National Defense Committee of the Chamber of Commerce has placed a plea for the maintenance and development of the field before the Senate Committee on Appropriations. A petition signed by an Illinois delegation asking for the maintenance and development of the field has also been presented to the Appropriations Committee.

SQUANTUM NAVAL AIR RESERVE STATION

THE United States Naval Reserve Air Station at Squantum, Mass., will begin its seventh year of operation in the spring of 1930. Squantum was the first United States Naval Reserve Air Station to be formed, and has served as the nucleus around which the present system of Naval Reserve aviation has been built.

Plans for the base, the first of its kind, were originated in 1923 by Lieut. (now Rear Admiral) Richard E. Byrd, who called a meeting of ex-Naval aviators in the New England district to establish facilities which would enable war pilots to keep up flight practice. He outlined his plan for the station and those present at the meeting pledged that if the Navy would give them a plane and a hangar, they would keep up the plane, fly it regularly, and make all repairs at their own expense. The Navy granted the request according to the conditions stated, and supplied personnel for maintenance as well as two ships.

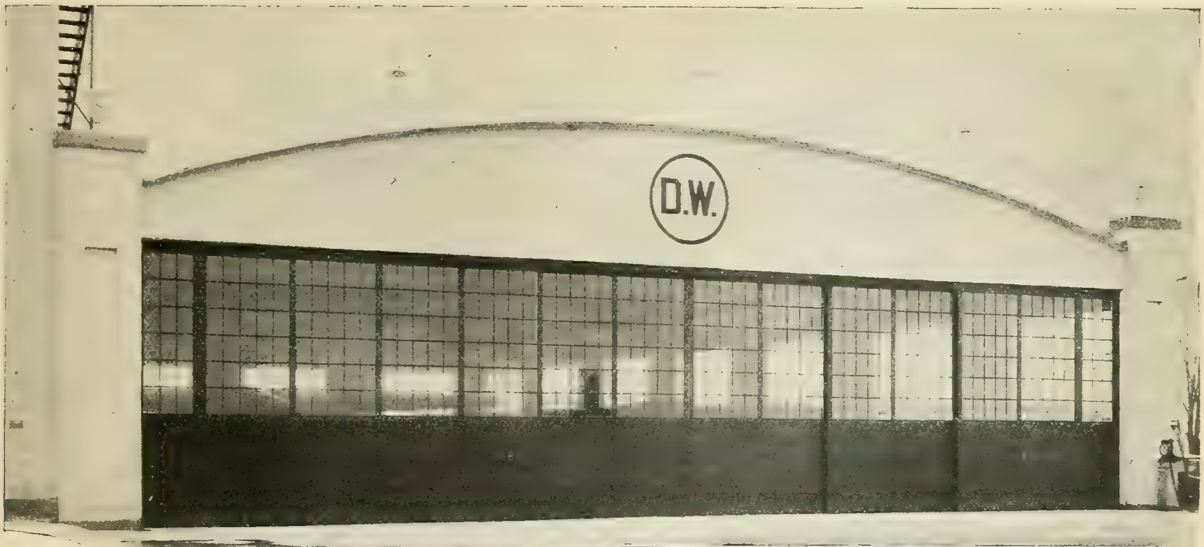
Lieut. George Pond was the first commander of the Squantum base, and was succeeded in 1924 by Lieut. Commander Noel Davis who was in 1926 appointed to head all Naval Reserve flying in the country to put in practice at all Naval Reserve bases the methods in use at Squantum. Lieut. Reginald Thomas succeeded Lieut. Commander Davis as commanding officer at Squantum.

In 1928 the Navy stationed members of the regular service in command of Squantum for the purpose of coördinating training policies. Lieut. George Haeberle was placed in command, and replaced in August, 1929, by Lieut. Marshal R. Greer, present commander.

In 1923 the flying equipment comprised one N-9 and one Wright amphibion. The present flying equipment includes seven NY's, one Vought U-20, one Vought Corsair, one UO-5 and two UO-1 seaplanes, one UO-5 and two UO-1 landplanes, two Fledglings and one NY-1. Several flying classes are trained at the Squantum Naval Reserve Station each summer.

The Navy has turned over to the War Department a large area of land adjacent to the hangar where a landplane field will be developed and completed by 1940, according to present plans. A landplane hangar has been erected at Squantum for the use of Navy planes, and training flights in landplanes are made to the Boston Airport and the Dennison Airport.

STANDARDIZED HANGARS



New D. W. Flying Service Hangar at LeRoy, N. Y., near Rochester. Truscon Steel Hangar Doors, Curved Track Type.

Truscon has specialized in housing for aeronautical requirements. Truscon Standardized Hangars—furnished in sizes and types for individual requirements—provide clear floor space, thorough fire protection and ample daylight. These permanent hangars can be readily enlarged or re-erected in a new location.

Truscon Steel Hangar Doors open the full width to permit the easy handling of airplanes. They operate easily and are sturdily built to give enduring service. They are furnished in all sizes and may have large glass areas for daylighting. Two types—Straight or Curved Track—are available to meet any hangar requirement.

Write for suggestions, quotations and literature.

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STEEL HANGAR DOORS

WESTERN NEWS

SELECTING AIR TRANSPORT PILOTS

By SILAS A. MOREHOUSE

Chief Pilot of Western Air Express

COMMON sense is a jewel of a phrase. It associates directly with good judgment, and in hiring pilots for Western Air Express—to pilot trimotored passenger planes through the air—I strive to determine the amount of good judgment a pilot has. Of course this comes only after we are satisfied that he knows perfectly the mechanical part of piloting.

The age of a potential pilot is an important factor. We would rather a man be between the ages of twenty-eight and thirty-two when hired. At this stage in life, the usual airman has completed his experimentation with planes in the air and he is satisfied with safe flight. He is in the prime of life and he should be physically sound.

It is very unusual when we take on a man who has left aviation for a while and wants to return to his old love. We believe that a pilot should have constantly associated himself with planes from the time he learned to handle the controls.

A pilot of a transport plane and the usual person who handles the control of a smaller ship, can be likened to the navigator of an ocean liner and the pilot of a small sailing vessel. A little experience may suffice the latter, but a thorough course of training and experience is needed for the man in whose charge will be placed so expensive a thing as a big liner.

In the future many pilots will come from the commercial aviation schools. Up until now our men have come chiefly from the ranks of the Army and Navy flying services, but the Government now requires a graduated pilot to remain in the service two years following graduation from flying instruction.

But an air transport license alone does not, under our system, entitle the holder to pilot a Western Air Express ship. This is a factor accounting for our record of 4,000,000 miles of flight without injury to a passenger.

The holder of a transport license must prove his worth with us as a co-pilot before he can take the controls. An Army or Navy man must travel a year as co-pilot before he becomes pilot.

A training course for an air transport license can be likened to the education of a physician. While the time required is not so long, the qualifications are great, and money expended as much. The average course for this instruction necessitates an outlay of about $7,000—$5,000 for the course and the rest for expenses. Then the graduate must figure on working as co-pilot for several months or years until he makes more than living costs.

Before a pilot is assured a position with Western Air Express he must pass a test of trial. He travels with at least ten pilots for thirty days, then a conference is called of the ten pilots who sat beside him. If the report is not definite, one way or another, another trial of thirty days is given. The final decision really rests with the pilots with whom he has worked.

Personally, I would rather a pilot that employed has not been in a crack-up, although others argue that such an incident makes an airman more careful. But I believe that if a man erred once, there is a possibility it may occur again. We know the record of every man we employ. A similar procedure is taken by steamship companies in selecting their navigators.

If months and years are taken to design, construct and test an airplane before it is ready for commercial use, I believe it is as necessary to take precautions just as exhaustive before we designate a man to fly it.

We must look upon our transport pilots as good engineers, as trained navigators, and as men of common sense.

UNION OIL COMPANY ANNOUNCES AERO OIL

THE Union Oil Company of Los Angeles Calif., recently announced the development of an airplane engine lubricant which meets Government requirements for oils used on planes of the Army Air Corps and the Naval Air Service. The product will be known as New Union Aero Oils and will be available at any of the distribution points maintained by the company throughout the country.

The Government specifications, according to which the Union company has developed the lubricant, are based on the requirement that Government planes must warm up quickly in any temperature and be ready for immediate action. The oil must be fluid at low temperatures and must retain a sufficient lubricating body at high temperatures, undergoing minimum change between extreme temperatures. The new oil was developed to insure efficient lubrication under varying temperatures encountered in day and night cross-country flying, especially during winter months.

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BOWLUS SOARS FOR OVER SIX HOURS

W. H. BOWLUS, holder of the American sail-flying record, established a new American record for soaring flight of six hours, 19 minutes and three seconds on January 13 in a flight at Point Loma, Calif., according to a recent report. Mr. Bowlus had previously remained aloft in an unofficial flight for five hours and twenty-five minutes at Point Loma. In his most recent flight, Mr. Bowlus took off at 1 a. m., and landed at 7:39 a. m., when the wind died down to eight miles per hour. The record flight was made in accordance with the official regulations of the F.A.I.

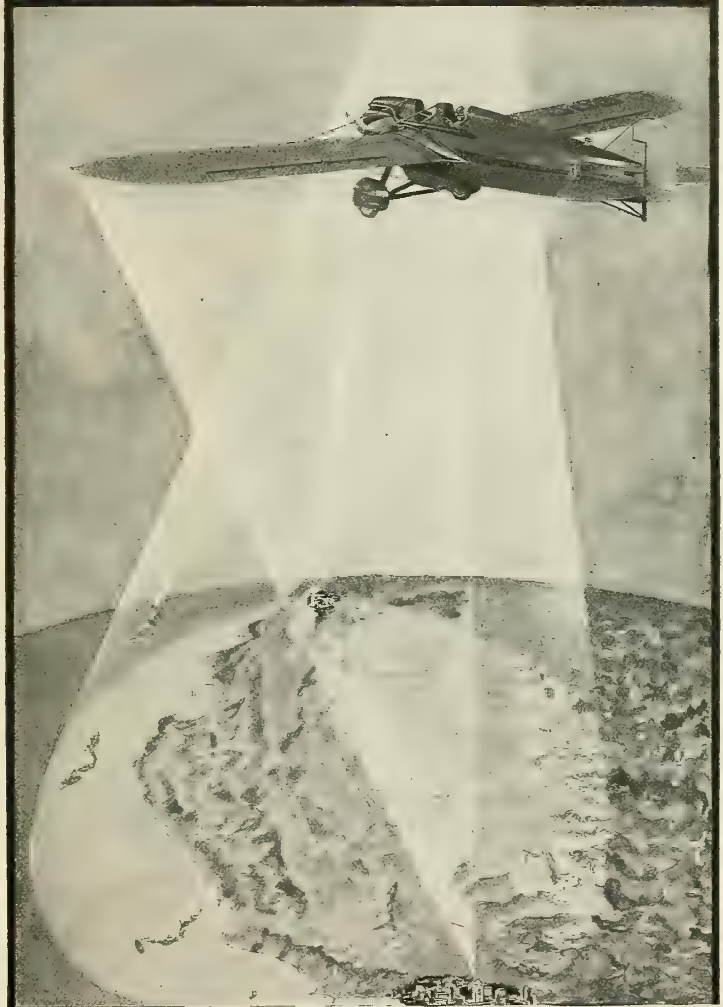
Alhambra Field Named International Port of Entry

THE airport of the Western Air Express located on Valley Boulevard, near Alhambra, Los Angeles, Calif., has been declared an international port of entry, according to a recent announcement of W.A.E. officials. The designation of the airport has resulted in a change of the passenger schedule of planes operated by Western Air Express effective January 10.

Heretofore, planes operated by the company leaving Agua Caliente, Mexico, for Los Angeles every afternoon have been required to stop at San Diego for customs inspection. As the San Diego field is not equipped for night flying the schedule was arranged so that planes could land and take off from that field before dark. According to the new schedule arranged as a result of the designation of the Alhambra field as an international airport, the San Diego stop has been eliminated and the planes will be flown direct to the Los Angeles terminal of the company, which is lighted for night flying. As a result, the flight from Agua Caliente is started at a later and more convenient hour.

Development and improvement of the Alhambra airport, which included the erec-

(*Continued on next page*)



EMSCO

LOS ANGELES TO OAKLAND —— GAS $4.14

Engineers and Master Craftsmen have built sturdiness into the EMSCO CIRRUS.... Innumerable times the Cirrus motor has demonstrated its dependability.... Now John Guglielmetti, former T. A. T. pilot brings us indisputable evidence of the economy of this remarkable combination of plane and motor.

Under normal weather conditions and with little or no wind, Guglielmetti flew this husky sport and training monoplane from Downey to Oakland in three hours and 45 minutes. The airline distance is 350 miles and it took 18 gallons of gasoline to refuel the plane to its capacity of 30 gallons. That is 4.8 gallons per hour or 19.4 miles per gallon. Figure it out for yourself with aviation gasoline retailing at 23 cents per gallon.

The price of the EMSCO CIRRUS is no more than that of the finer motor cars and its ability to furnish economical transportation over great distances invites comparison. Responsible dealers will be interested in the EMSCO sales plan. Details will be forwarded on request.

EMSCO AIRCRAFT CORPORATION ◆ DOWNEY ◆ LOS ANGELES COUNTY ◆ CALIF.

A COMPLETE LINE OF AIRCRAFT FOR LAND AND SEA

(Continued from preceding page)

tion of buildings and installation of equipment, has been practically completed at an estimated cost of $1,000,000. The passenger depot, constructed at a cost of $100,000, is a four-story brick structure fully equipped with interior fittings and furnishings. Heads of various operations departments will be provided offices in the building. Other buildings erected include two large garages for the housing of automobiles. Each garage is 50 feet by 150 feet, accommodating about 40 automobiles each, and they will be used for the purpose of storing cars while the owners are absent on aerial trips.

Work has been started on the construction and equipment of a powerhouse which will be 50 feet by 50 feet. The house will be used to store electrical equipment which is designed to insure uninterrupted lighting of buildings and field. Construction of a hangar which will be used for storage or a machine shop is scheduled to start within the near future. During 1929 a storage hangar 380 feet by 85 feet was constructed, and the hangar which is yet to be built will be of the same dimensions.

1929 ACTIVITIES OF THE BOEING SYSTEM

PLANES operated by Boeing Air Transport on the Chicago-San Francisco route flew 2,780,000 miles in 1929 as compared with a total distance of 1,817,699 miles in 1928, according to a report of Boeing system activities, recently published by company officials. Included in the total number of miles flown in 1929 is the mileage of an extra nightly round trip air mail flight inaugurated May 1, 1929, in which approximately 1,300,000 miles were flown during the year.

Air mail loads increased from 493 tons in 1928, to 906 tons in 1929; the number of passengers carried increased from 1,963 to 2,850. Boeing completed on December 25, 1929, the flying of 8,000,000 miles on the San Francisco-Chicago and Los Angeles-Seattle routes, with only three fatalities in thirty months of operation.

In addition to the night air mail flight inaugurated on May 1, the company began the operation of regular scheduled night passenger service between Oakland, Calif., and Salt Lake City, during the year. The company recently started preparations for the establishment of passenger transport service with trimotor planes, and has taken delivery of eight trimotor Boeing eighteen-passenger transports which will be utilized for this purpose.

It has also completed experiments for the purpose of developing a radio communication system; and a workable radiophone system of voice communication between pilots and the ground and between pilots of planes in flight was designed. Within sixty days the company will complete the equipping of planes on the San Francisco-Chicago route with radio.

Planes of Pacific Air Transport, unit of the Boeing System operating between Los Angeles and Seattle, flew a total of 830,000 miles during 1929, as compared with a total of 699,582 miles in 1928; 3,279 passengers were carried during 1929, as compared with 1,484 in 1928; the number of pounds of mail carried increased from 137,988 in 1928 to 254,457 in 1929.

Pacific Air Transport was acquired by the Boeing company in 1927 and now utilizes only Boeing equipment. During the year all of the Boeing Model 40-B planes were re-powered with Hornet and Wasp engines manufactured by the Pratt and Whitney company. The company reduced passenger rates seven cents a mile in 1929 and by the use of automatic refuelling system saved four minutes at each of the eight stops on the route, shortening the northbound schedule one hour and forty-five minutes and the southbound, one hour and fifteen minutes. Improvement work was completed during the year at several of the airports and terminals maintained by the company on its Pacific Coast routes.

Emsco Aircraft Inaugurates Production Schedule

THE Emsco Aircraft Corporation recently announced that its production schedule on the line of Emsco planes is under way in the $1,000,000 factory at Downey, Calif. The company will manufacture an eight-place cabin monoplane with single-engine, twin-engine or trimotor power plants. The single-engined ships will be powered with Wasp engines of 450 horsepower; the twin-engined ships with Wright Whirlwind 300 engines; and the trimotor ships with Curtiss Challenger engines of 170 horsepower each. These models will be equipped with pontoon fittings to be convertible into seaplanes.

The company will also produce the Emsco Cirrus sport and training plane, a model of which recently flew from Downey, Calif., to Oakland, Calif., a distance of 375 miles, consuming 18 gallons of gasoline and averaging 4.8 gallons per hour. The company has started the construction of a transport plane with a capacity of thirty-two passengers, two pilots and a radio operator. Construction of this plane is scheduled for completion within four months.

The Emsco corporation announced that construction has been started on a single-engined monoplane with a gasoline capacity of 1,000 gallons. This plane is designed for use on a contemplated trans-Pacific flight from the United States to Japan. The company has also completed engineering designs for an eight-place trimotor amphibion. A large addition to the present plant will be started in the early part of this year, according to Emsco officials.

A. A. Zambrano has been appointed supervisor of the export sales in Central and South America for the Emsco Aircraft Corporation.

VETERANS heading the flying staff of the Boeing School of Aeronautics at Oakland, Calif., are shown in the accompanying photograph. They are, left to right: E. E. Dildine who has 6,000 hours including 2,200 hours instruction Army and Navy flying; George Myers, chief of flying instruction, past president of the Pilots' Association, has 6,000 hours, most of it with the air mail; Harvey Greenlaw was for the past six years graduate instructor R.O.T.C. University of California; and Leroy Gregg entered the U. S. Army as flying instructor ten years ago. This quartet of Boeing school instructors has a total in excess of 20,000 hours flying experience.

Four leaders of the teaching staff of the Boeing School of Aeronautics

Mamer Flying School Receives Dept. of Commerce Approval

THE Mamer Flying School at Spokane, Washington, was approved by the Department of Commerce on December 27, 1929, to give ground and flying instruction leading to private, limited commercial and transport pilots' licenses. The certificate of approval was granted the Mamer school by the department following an inspection of personnel, organization and equipment.

The Mamer Flying School is located at the Spokane Municipal Airport, four miles from the business center of Spokane, and is readily accessible to the city by surface transportation. The flying equipment used by the school for primary and advanced instruction includes the following makes of planes: Waco, Curtiss-Robin, Buhl, Stearman, Ryan and Ford trimotor. All flying equipment is licensed by the Department of Commerce.

The school was founded ten years ago by Lieut. Nick Mamer, who is chief instructor at the school. He is assisted by five other transport pilots who have been licensed as flying school instructors by the Department of Commerce. Approximately 300 students have been trained and

(Continued on next page)

CUSTOM FINISHED AIRCRAFT

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AIRCRAFT COMPANY
INCORPORATED
LOS ANGELES MET. AIRPORT
VAN NUYS, CALIFORNIA

QUALITY IN EVERY CONSIDERATION

(*Continued from preceding page*)

graduated by the school during its ten years of operation.

Mamer Air Transport operates the Mamer Flying School. C. I. Paulsen is president of the company, N. B. Mamer, vice president, and Newton Wakefield, general manager.

CONTACTS

[F. E. SAMUELS]

IF THERE IS one man on the West Coast who is entitled to a lot of credit for his untiring efforts in the interests of the aviation industry, that one is Loxla C. Thornton, better known as the armless pilot. Loxla has flown almost every known make of airplane, the controls of the planes being equipped with extensions conforming with the hooks attached to the stumps of his arms. Thornton is president of the Hercules Airplane Products Company, distributors of Bellanca and Barling airplanes for California, Arizona and Nevada. He is accompanied by Bob Larsen on his flights over the territory.

I WOULD like to see the look of astonishment on the faces of those who have not visited the airports of Los Angeles for the past two years, when they do have that opportunity. Less than two years ago there was not a single class A airport. Today we have so many that would be a pride to any city that we feel proud to have been able to watch their growth.

Each airport is striving to outdo the others in the architecture of its buildings. Among the most prominent in this respect is the municipal airport, formerly Mines Field, with buildings that would do credit to the business section of any city. Brick and fire-proof material, uniformity in architectural construction, yet each having its own individuality, characterizes the field's structures. The buildings at the new Western Air Express airport are not only attractive but are built for efficiency. We are all watching the United Aircraft buildings, now almost completed. These buildings from all appearances, are to be the last word in architectural beauty. The grounds are being laid out to conform with each separate building, which are of brick and fire-proof material. The Grand Central Air Terminal, with its concrete runways, depot, administration building and hangars, compares favorably with any air terminal in the country. Clover Field is probably one of the best summer airports in the country. The Los Angeles Metropolitan Airport has new buildings being erected almost continuously. The Aero Corporation Airport was the first in the city to lead off with attractive building. Its administration building, of Spanish design and shops and hangars set a fast pace.

AMONG the privately owned airplanes of Southern California, few have flown over more territory and visited more cities and states, in a similar period of time, than the Fokker-10A, Executive Model, purchased in October, 1929, by R. S. Mcmillan, president of the Mcmillan Petroleum Corporation of California from the Aero Corporation of California. Since he bought the Fokker Mr. Mcmillan, with Eddie Martin at the controls, has made three trips east, and at this writing they are crossing the country on their fourth. The states visited on their trips include Nevada, Arizona, New Mexico, Texas, Oklahoma, Missouri, Illinois and Minnesota.

ROY T. MINOR was lately appointed chief test pilot for the Angelus Aero Corporation, located at the Los Angeles Metropolitan Airport. This announcement was made by C. C. Ludlow, general manager of the corporation, and represents the first step in an extensive program of expansion and development projected for 1930 by his concern. Minor is one of the best known pilots on the Pacific Coast and brings to his new post a wide field of experience in both mechanical and flying phases of aviation.

The Angelus Aero Corporation is one of the pioneer concerns in the aviation industry on the West Coast. It represents the Standard Oil Company at the Metropolitan Airport, as well as maintaining distributing headquarters for several well-known airplane and aircraft engine manufacturers, the Aeromarine Klemm Corporation and the Le Blond Aircraft Motor Corporation being among the aviation concerns for which it is the Southern California representative.

SELLING air transportation has received an impetus in the past few weeks never before attained. Each of the different airline companies seems to realize that, to make its lines financially successful, the general public must be sold the knowledge that transportation by air is not only safe and comfortable, but that the expense of traveling by air is no greater than it is by rail, with the added attraction of the great saving of time over all other means of transportation.

Less than a month ago the Western Air Express made a special rate for Federal, state, county and city employes of railroad-plus-Pullman fares. This special rate was at once adopted by the Mid Continental Air Express, operating lines from Denver to El Paso and to Kansas City. The West Coast Air Transport made similar reductions on its lines between Seattle, Portland and San Francisco, via Oakland, as did Standard Air Lines from Los Angeles to El Paso, via Tucson and Phoenix. Then came the announcement that Southwest Air Fast Express had cut its rates over the 750-mile division between Sweetwater and St. Louis to a five cents a mile rate. T. A. T. then announced a rate from coast to coast even lower than railroad fare, plus Pullman, over the Transcontinental air-rail route.

These rates with the saving of two days of travel in crossing the continent should do a lot toward selling air transportation to our traveling public.

CALIFORNIA

OF THE 2,000,000 persons who traveled by airplane in 1929, either aboard modern air transports or on private and taxi planes, forty-nine per cent were from the ranks of the business and professional world, a survey made by the statistical department of Western Air Express shows.

The results prove that the saving of speed is not a luxury but a vital necessity to those to whom traveling time means money, according to officials of the firm. Questionnaires sent to the various members of chambers of commerce and civic clubs show that one-half of the average successful, middle-aged business men in America have ridden in an airplane four times.

CONSTRUCTION of an electrical substation with an initial capacity of 1,000 horsepower has been started by Western Air Express at the Los Angeles Airport to supply power for the company's ground activities at the field. Plans include an estimated expenditure of $60,000 for the installation of underground wiring, electric steam heat, electric automatic control for doors, and sixteen transformers.

The transformers will be used to decrease a 16,000-volt, three-phase alternating current to 2,300-volt, three-phase current which will be distributed over the terminal. The total amount invested in electrical work at the Los Angeles Airport by Western Air Express is estimated at $75,000.

Don McRae, former chief radio dispatcher of Western Air Express, has been appointed chief engineer in charge of radio experimental work for the company, and David P. Gibbons has succeeded Mr. McRae as chief dispatcher.

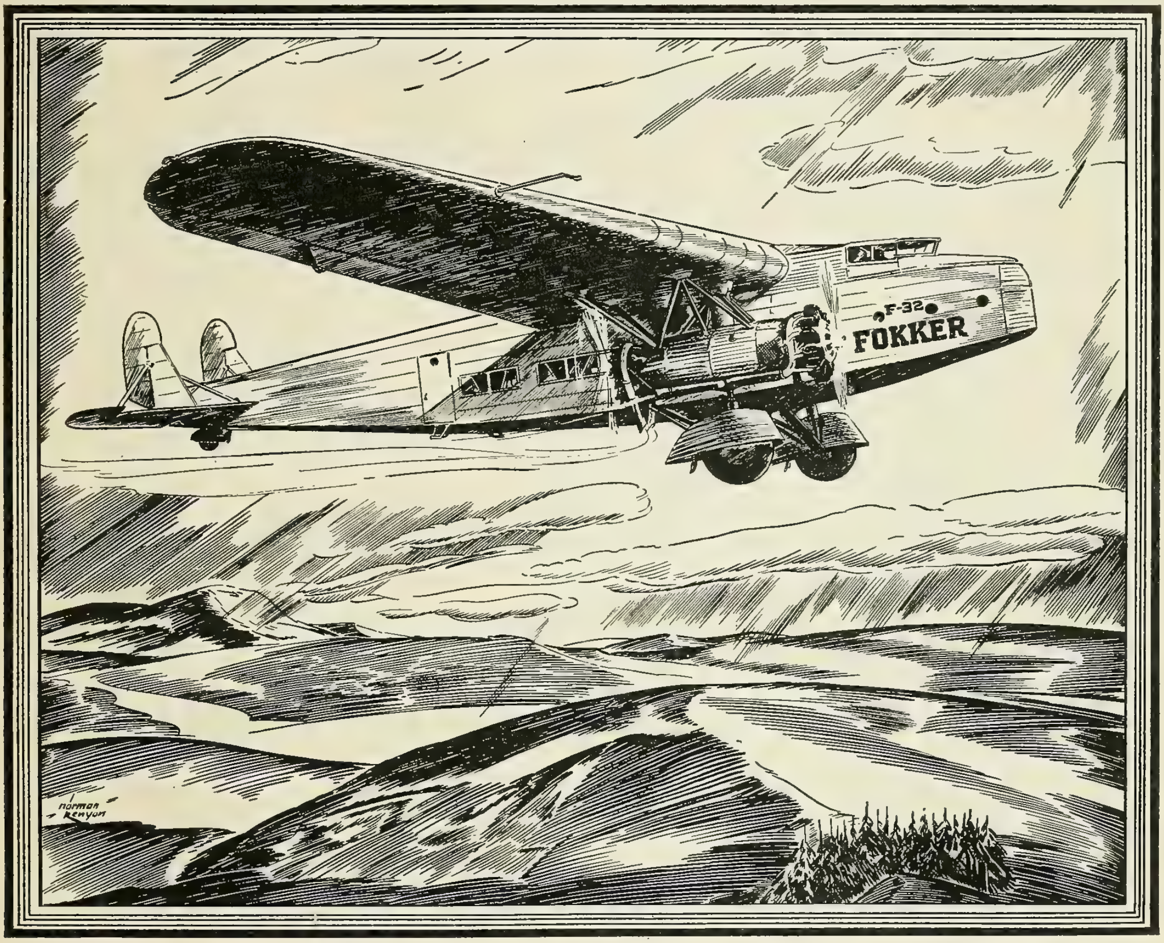
THE first annual meeting of the common stockholders of the Aero Corporation of California was held recently to elect the board of directors for 1930. The following were elected to the directorial board of the firm: James A. Talbot, Harris M. Hanshue, Guy Witter, Robert L. Chambers, L. G. McNeil, Frank Hitchcock, Paul E. Richter, Jr., Walter A. Hamilton and Jack Frye.

A PLANE operated in regular air transport service by Western Air Express recently completed 200,000 miles of flying on the route between Los Angeles and San Francisco without an accident to the plane or to passengers. The plane is a trimotor Fokker. During two years of service the plane has been in the air a total of 3,500 hours and has had seven engine replacements. The ship carried 6,183 passengers during its period of operation and has consumed 120,182 gallons of gasoline.

(*Continued on next page*)

FOKKER FACTS—I

THE NEW F-32 SLEEPS 16 PASSENGERS



THE FOKKER F-32 is the largest plane built in America. Its wing spread is 99 feet. It carries 30 passengers by day, and sixteen by night. Powered by four Pratt & Whitney 575 h.p. Hornet engines, its high speed is 140 m.p.h. and its cruising speed 120 m.p.h.

This giant Fokker airplane was evolved by the manufacturer who has built more planes than any other man or organization on earth, the manufacturer whose planes have made twice as many world-famous flights as any other make of plane, and whose planes have flown over 25,000,000 miles on American transport lines, establishing a record for dependability that has never been approached.

This plane was designed and built with the same surety and skill that pilots and transport executives have come to expect in every one of the ten models now produced by the affiliation of Fokker and General Motors Corporation.

Because of the useful carrying capacity—low operating cost, economical maintenance and low initial investment, Fokker planes are today making it possible for air transport companies to compete with rail transportation at a profit.

For the use of business executives, for pleasure, and for transport use, Fokker now makes ten different models of airplanes: single and multi-engined types, land planes, sea planes, flying boats, amphibians. Requests for information or demonstration are invited, and will be promptly answered. Fokker Aircraft Corporation, General Motors Building, New York.

FOKKER

AFFILIATED WITH GENERAL MOTORS CORPORATION

(*California News continued*)

CALIFORNIA leads the nation in the number of licensed and identified aircraft, pilots, mechanics and airports, according to a report of the Department of Commerce. Previously, New York State led the nation in this respect.

According to the most recent figures available, California is first with 1,050 licensed and identified aircraft, and New York State is second with 975. There are 161 airports in California, according to the report, 101 in Texas, 72 in Ohio, 67 in Illinois, and 57 in New York State. There are 1,382 licensed airplane mechanics in California, and 640 in New York State, and 436 in Illinois.

THE first annual meeting of the common stockholders of the Aero Corporation of California was held recently for the purpose of electing the board of directors for 1930. Members of the board of directors elected for the coming year include: Harris M. Hanshue, James Talbot, Guy Witter, Robert L. Chambers, L. G. McNeil, Frank Hitchcock, Paul E. Richter, Jr., Walter A. Hamilton, and Jack Frye.

AIRCO., INC., has established field headquarters at the field of the Aero Corporation of California, Los Angeles, where the company will conduct sales demonstrations of Savoia-Marchetti amphibions, manufactured by the American Aeronautical Corporation. The Airco company has been appointed West Coast distributor for the American corporation. Charles Vale is president of the Airco firm.

Distinctive Beacon at Grand Central Air Terminal

A BEACON which flashes colored lights at intervals has been installed at Grand Centrail Air Terminal, Glendale, Calif., for the purpose of identifying the airport. The beacon will be used to replace the ordinary beam light; it flashes white, green and then red at intervals of three and one-third seconds. The light is known as the Distinctive Beacon and is manufactured by the Aeronautical Products Corporation of Los Angeles, Calif. The mechanism may be arranged to flash more than forty different color combinations at intervals which may be varied as desired to give each airport a distinctive light that will identify the field for the pilot.

INSTALLATION of an illuminated 100-foot concrete circle marker at the Oakland Municipal Airport has just been completed. The installation of the marker has hitherto been delayed because of the construction program at the Oakland field. The major developments of the field are now complete. The circle is constructed in fourteen segments so that with further development of the field it may be readily moved. One light is located in each segment and is set flush with the field surface. Heavy glass protects the lights from damage.

THE Axelson Aircraft Engine Company of Los Angeles, Calif., will increase its production schedule in 1930, and will establish a national chain of repair and service stations for Axelson engines, according to a recent report by J. C. Axelson, president of the company. In a review of the company's activities included in the report, Mr. Axelson announced that employees of the company were recently awarded bonuses by the officials of the firm. The Axelson engine has been endorsed by the following aircraft manufacturers: Travel Air, Boeing, Spartan, Swallow, Command-Aire, Wallace, American Eagle, Schofield, Lincoln, and Parks.

THE California State Chamber of Commerce has formed a special aviation legislative committee which will survey all legislative measures pertaining to the aeronautical industry in California. The committee will work in coöperation with the governor's special aviation committee to secure legislative action favorable to the growth and advancement of aviation.

A SURVEY of the upper air strata for the purpose of analysing the germ contents was recently completed in the Los Angeles area by Dr. Charles Boston. The airship, *Volunteer*, of the Goodyear-Zeppelin Corporation was used for taking upper air observations in the survey. Results obtained showed that the upper air strata contains many germ spores whose natural habitat is in the clouds, from where they are conveyed earthward in rain or snow.

THE Miller Airplane Products of Los Angeles, Calif., recently entered its second year of operation. The company manufactures and distributes aircraft engine parts, accessories and equipment. The following factory representatives have been appointed by the Miller company: Curtiss Flying Service, Nicholas Beazley Airplane Company, Inc., Universal Aviation Corporation, Air Transport Equipment, Inc., Garden City, L. I.; Logan Aviation Company, Cleveland, Ohio; and Johnson Airplane and Supply Company, Dayton, Ohio.

Aviation School of the Aero Corporation of California

THE Aero Corporation of California School of Aviation is situated in the southwestern section of Los Angeles. The surrounding acreage is practically level and a steady westerly breeze gives the flying student weather conditions advantageous for flight instruction with which to cope during his course. Transportation to and from the business center of Los Angeles is provided by automobile. street car or bus. Students may board and room within a few minutes' walk of the field. A cafe is maintained in the administration building for the convenience of students.

The Aviation School of the Aero Corporation of California was approved by the Department of Commerce to give ground and flying instruction leading to private and limited commercial pilots' licenses. The transport pilot's course was approved on October 26, 1929. The course of study exceeds the requirements of the Department of Commerce, in regard to the amount of flying time and the amount of ground school instruction given.

The private course requires 22 hours of flying time and is usually completed in about three months. The first 12 to 14 hours consist of dual instruction and the remaining eight hours is utilized in solo flying. Phases of advanced instruction are given in this course and include level flying, banks, turns, wingovers, spins, stalls, stalling turns, climbing turns, approaches and sideslips. The limited commercial course consists of 50 hours of instruction, 25 hours of dual instruction and 25 hours of solo flying. The

(*Continued on next page*)

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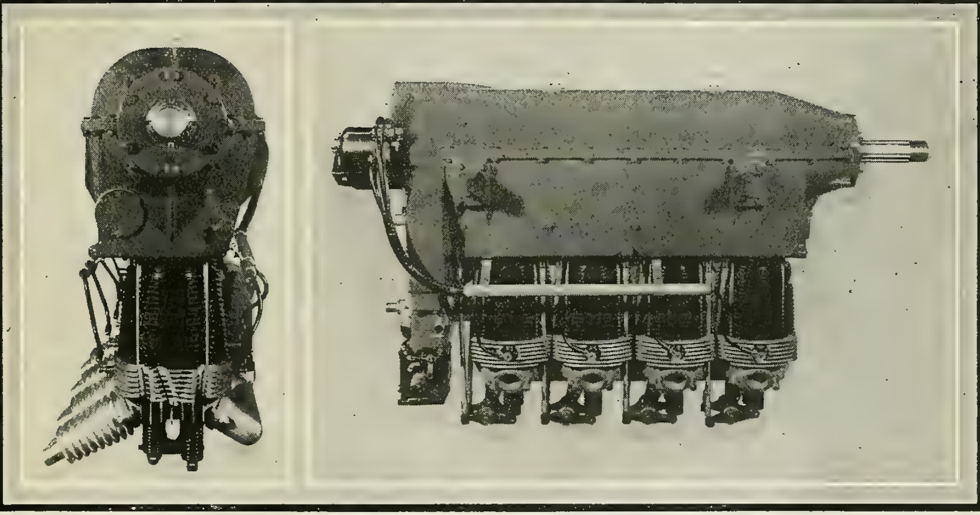
PACIFIC AIRMOTIVE CORP.

3417 Angeles Mesa Drive Los Angeles, Calif.

The Menasco Pirate

Inverted Air-Cooled Four-in-Line



Four Cylinders, in line, inverted; displacement 326 cubic inches, rated full 90 H.P. at 1900 R.P.M. Weight 270 lbs., Ignition — 2 Scintillas, Carburetion — Stromberg. Splendid crankshaft, ball bearing rocker arms and many other features.

The Menasco Pirate brings new features that readily lend toward more efficient and smarter design. The inverted, in-line construction gives excellent visibility with the least amount of air resistance and offers a high center of thrust, with a low center of gravity. Improved lubrication and heat dissipation in the Pirate means longer life and greater efficiency.

The Pirate was designed for needs of modern aircraft in the 100 H.P. class. Immediate delivery can be made with ample production facilities ready. We invite your inspection, for we know it is the finest that money can buy.

Menasco Motors, Inc.

6718 So. McKinley Ave., Los Angeles, Calif.

(California News continued)

dual instruction course is similar to that given in the private course with additional training in cabin planes and ships other than those used in primary training.

Only aircraft that have been licensed by the Department of Commerce and that have been inspected each day are used. Primary training is given in Kinner, LeBlond and OX-5-powered planes. The ground school course is included in all flying courses and may be taken by students not enrolled in a flying course. Both day and night classes are held twice weekly. Access to machine shops, engine repair shops, rigging department, welding and paint departments is provided in the ground school course. Ground school instruction includes, theory of flight, engines, navigation, meteorology and Department of Commerce regulations.

The training field covers an area of 160 acres and has an east-west runway 3,000 feet in length. Flanking the field on the south are the administration building and larger hangars. In the former are the executive offices of the school and in the hangars are located the shops that house equipment for engine repair and testing. Thirty individual hangars mark the northern boundary of the Aero Corporation field.

EMORY B. BRONTE, California-to-Hawaii flier, has been appointed a member of the California State Chamber of Commerce aeronautical committee for the Central Coast council by Harrison S. Robinson, regional director. The appointment was announced by W. F. Graham, manager of the Central Coast council. Mr. Bronte is manager of the aviation department of the Associated Oil Company, with headquarters in San Francisco.

ALAMEDA

[H. V. WALDORF]

CHANGES in the Curtiss-Wright staff in the San Francisco Bay area include the promotions of Capt. F. M. Bartlett and Capt. W. H. Royle. Capt. Bartlett, former division manager has been placed in charge of all western activities of the Curtiss-Wright Airports Corporation. Capt. Royle, formerly director of flight training has been promoted to director of operations for the Curtiss-Wright Flying service in the Bay area. Lieut. E. B. Wilkins, former Navy flier has been placed in charge at Oakland airport and E. J. McKeon at Alameda airport. The division headquarters are located at Alameda Airport.

THE north wall of the $300,000 seaplane base and yacht harbor under construction at Alameda Airport has been completed. The remainder of the $3,000,000 development program for the flying field is expected to be materially speeded up with the finishing of this unit. Installation of lighting equipment has resulted in the inauguration of night landings by the air transport planes.

Work on the foundations for the airplane depot and hangars is under way at the San Francisco Bay airdrome on the west Alameda tidelands.

CULMINATING an extensive survey by Norman Bliss, Department of Commerce airway engineer, the site for the Oakland directional radio beacon, to be the key station of the proposed Pacific Coast chain, has been selected near the Oakland Municipal Airport. From this beacon, to be operated by remote control from the airway radio station west of the Oakland airport, three guiding waves are to be broadcast; one south to Fresno, one north to Medford, and a third east to Reno. The beacons are planned to be in operation by spring, Mr. Bliss reported.

OAKLAND

[H. V. WALDORF]

WITH more than 200 students enrolled, new classes in the master pilot and the mechanics' courses were opened January 3 at the Boeing School of Aeronautics at Oakland Municipal Airport.

FOLLOWING the construction of a large hangar and the leveling of a 3,000-foot runway, the Berkeley Aviation Service, Limited, has inaugurated a commercial flying service at the Bergeley Municipal Airport. The flying field is located on the San Francisco Bay shore, about one mile

(Continued on page 160)

AIRCRAFT INSURANCE

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Compensation . . . Accidental
Damage . . Personal Accident
Ground Property Damage . . .
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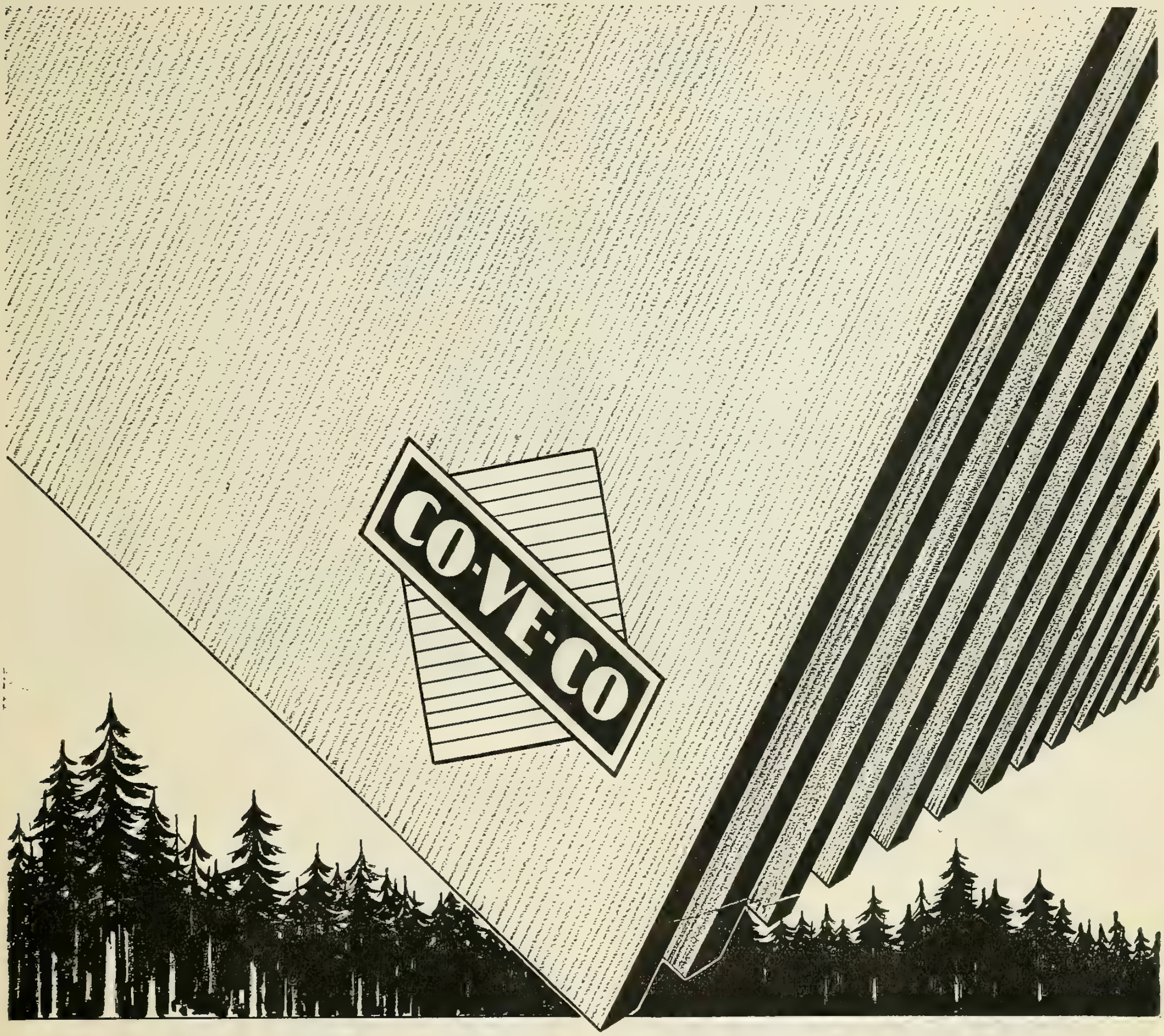
UNIFORM QUALITY FEATURES



CO-VE-CO PLYWOODS

EVERY square inch of CO-VE-CO Aircraft Plywood is uniform in quality, in cellular structure and in composite strength! It is manufactured, as well, to exact uniform thickness... CO-VE-CO uniformity is achieved by an exclusive method of manufacture that precision-peels veneer from logs in their natural state as they come from the forest. Under the CO-VE-CO process steaming or cooking to soften woods for peeling is unnecessary. Every fibre is intact; none are bursted; cells are not ruptured. Every square inch of CO-VE-CO veneer retains the mighty strength endowed by nature through centuries of growth... Secure this uniformity for your 1930 production! CO-VE-CO Aircraft Plywoods, manufactured from Port Orford Cedar or Selected Sitka Spruce bring added structural strength to your aircraft. Sheets of standard sizes and thicknesses are stocked for immediate delivery. Or if you prefer, communicate with our Sales Representatives for information on how CO-VE-CO Aircraft Plywoods may be manufactured to your own specifications for sheet sizes and accurate thicknesses.

PORT ORFORD CEDAR PRODUCTS COMPANY
Marshfield, Oregon

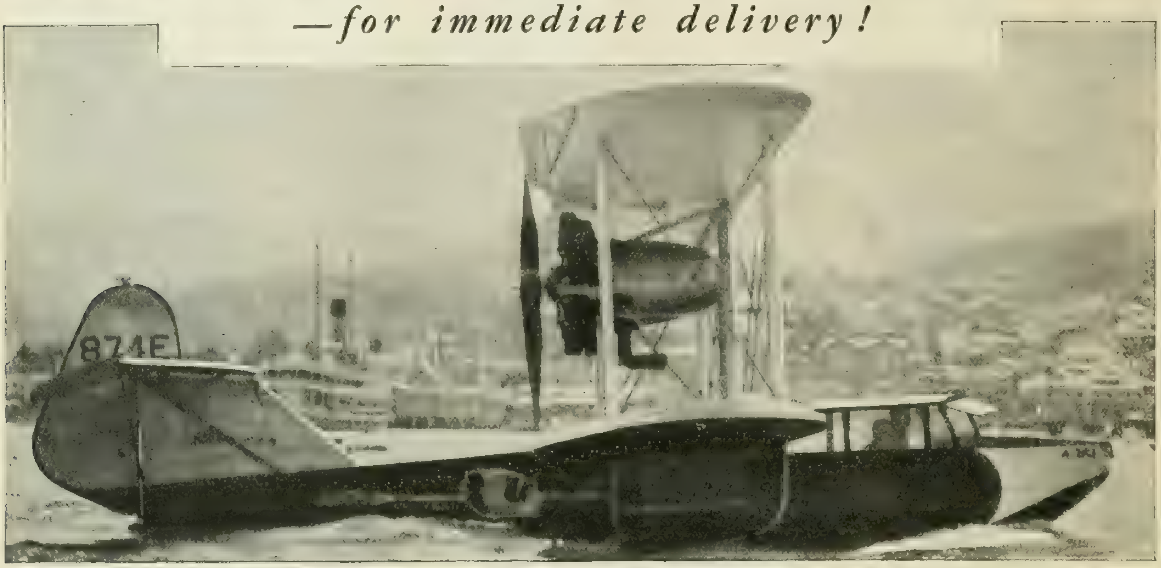
Southern California
CALIF. PANEL & VENEER CO.
955 S. Alameda Street
Los Angeles

Exclusive Sales Representatives
DANT & RUSSELL, INC.
Portland, Oregon

Northern California
H. B. MARIS PANEL CO.
735 Third Street
San Francisco

Now — More
BOEING FLYING BOATS*

—for immediate delivery!



* Model 204, as recently improved, is even superior in performance to those so successfully operated by Western Air Express (pictured here), Barnes & Gorst (Seattle-Victoria Air Mail contractors), Western Canada Airways, etc. It is the outstanding flying boat on the market.

The original Boeing reputation was established in the construction of flying boats, one of which, with 500,000 miles of flight, has been flown farther than any other airplane. Each time a better flying boat has been built, Boeing has set the pace.

Now Model 204 ***has been improved again.*** Its speed has been increased 15 miles per hour, take-off time reduced 8 seconds and climb increased 250 f.p.m. Test landings in rough open seas have demonstrated Model 204's staunch hull construction. Rigid schedules over routes scattered from Alaska to Florida—flying good weather and bad—have proved it airworthy, speedy, economical to operate! And, once inside its roomy, sound-proofed, glass-enclosed cabin, you'll enjoy the comforts of a yacht at 133 miles per hour.

Brief specifications are given below. Operators and sportsmen are invited to write for detailed data.

BOEING AIRPLANE COMPANY

Division of United Aircraft & Transport Corporation

SEATTLE, WASHINGTON

(In Canada: Boeing Aircraft of Canada, Ltd., Vancouver, B. C.)

PERFORMANCE

(Boeing Model 204—**with full load**)

Speed: High speed 133 m.p.h. Cruising speed 110 m.p.h.

Cruising Range: 450 miles (4½ hrs.)

Quick take-off: slow landing: Takes off in 15 seconds after 750 ft. run. Lands at 59 m.p.h.

Power plant: 1 Pratt & Whitney 450 H.P. "Wasp" engine.

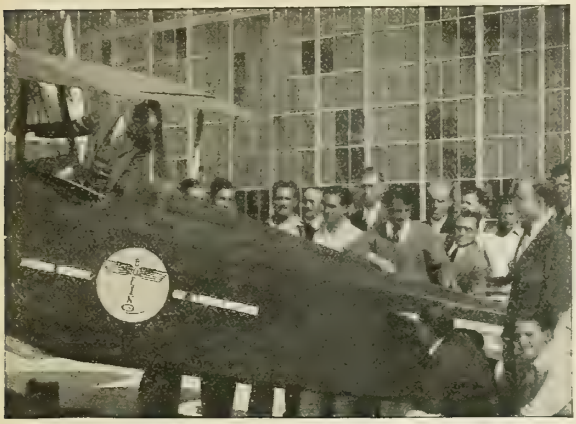
Actual pay load: 5 passengers and baggage (913 pounds).

Fabric covering: Permits speedy, economical, accurate inspection—a safety factor.

Mahogany Plywood Hull: Eliminating possibility of danger of salt water corrosion and materially reducing maintenance cost.

Completely equipped: No extras to buy, no weight to add.

Special features: Noise-proofed and insulated cabin; separate baggage compartment; electric inertia starter; navigating lights; elevating windows and windshield, non-shatterable glass; special compartment for anchor gear. Comfortable leather-upholstered seats. Complete instrument board equipment including air speed meter, altimeter, Pioneer compass, bank and turn indicator and usual engine gauges.



Let BOEING Air Mail Pilots

teach you to fly!

EVERY day Boeing planes fly 15,000 miles with the air mail —carrying more than 50% of the U. S. total poundage. A quarter of all U. S. air mail is carried by *Boeing pilots* flying *Boeing-built* planes on *Boeing-operated* airways.

On this practical foundation the Boeing System of Aeronautical Training has been built. *Experience*—not just theory —forms the background for every course. Boeing instructors are seasoned pilots—some with as many as 5,000 flying hours —to whom small airports, bad weather, mountainous terrains and other flying conditions, are merely a part of the day's work. With an instructor of this type in the front cock-pit, you will learn many "tricks of the trade"—in addition to those important fundamentals that govern safe air transportation.

Advanced training makes a competent pilot. Don't just "pick up" flying. Choose your school with an eye to your future. Ask yourself: [1] *"Which school's diploma will be the best endorsement when I seek a connection after graduation?"* . . . [2] *"How complete and up-to-date is the equipment I will use?"* . . . [3] *"How competent are my instructors?"*. . . Check both ground school and flying courses . . . By these tests Boeing training is a sound investment.

New classes form quarterly. Mail coupon below or write us about your plans for an aeronautical career.

BOEING SCHOOL of AERONAUTICS

Division of United Aircraft and Transport Corporation

Airport · Oakland · California

I am interested in the Boeing School of Aeronautics' course I have checked:

☐ Private Pilot
35 hrs. ground school. In air, 10 hrs. dual, 8 hrs. solo.

☐ Transport Pilot
140 hrs. ground school. In air, 50 hrs. dual, 150 hrs. solo.

☐ Limited Commercial
70 hrs. ground school. In air, 25 hrs. dual, 25 hrs. solo.

☐ Master Mechanic
Training for operations and manufacturing, 22 subjects. 1008 hrs. (lecture-shop).

☐ Master Pilot Ground School
Includes subjects given only in universities. 864 hrs. (lecture-shop). 22 subjects.

☐ Special Master Pilot
Big plane flying. Open to Transport License holders.

☐ Airplane and Engine Mechanic
140 hrs. in lecture, laboratory and shop.

Name and Street Address

City and State AD-230

SOMETHING TO PONDER OVER

During the life of the OX-5 many new production motors have come and fallen by the wayside. Those that still exist are beyond the reach of the average flyer. This gives rise to the belief that the OX-5 is still the flyer's best friend where economy, reliability and first cost is considered.

Every item produced by our organization is designed with the thought of furthering efficiency in the OX until the day when new production motors compare with it in price and efficiency.

The OX, equipped with our materials, gives astonishingly satisfactory results.

Write or wire to us direct, or to any of our factory representatives for descriptive folder and price list of all Miller products.

MILLER AIRPLANE PRODUCTS

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LOS ANGELES; CALIFORNIA

FACTORY REPRESENTATIVES

Curtiss Flying Service,
27 W. 57th St.,
New York, N. Y.

Nicholas-Beazley
Airplane Co., Inc.,
Marshall, Mo.

Universal Aviation Corp.,
Robertson Div.,
Anglum, Mo.

Air Transport Equipment, Inc.,
Hangar 20-A, Curtiss Field,
Garden City, N. Y.

Logan Aviation Co.,
716 W. Superior Ave.,
Cleveland, Ohio.

Johnson Airplane &
Supply Co.,
Dayton, Ohio.

(California News continued)

from the University of California campus. Frank Pierce is general manager and Harry Abbott, chief pilot. Five planes are used in air taxi and student instruction work.

RADIO engineers of the Western Air Express and Boeing Air Transport are preparing for a test of the paraboloid, a radio navigation instrument invented by Dr. Frederick Kolster, inventor of the marine radio compass. The test is to be made on the Oakland-Los Angeles route of the Western Air Express. A special radio directional beacon is to be installed on the route by the Federal Telegraph Company for the test. The paraboloid works in conjunction with a parasol radio beacon, and by the use of signal lights informs the pilot when he is over the runway of a landing field. First ground tests indicate that the intensity of the light can be calibrated to inform the pilot of the exact altitude over the flying field.

FIFTY-SIX students are enrolled in the ground school course conducted at the University of California by the United States Naval Air Reserve. Approximately 20 of this number are to be selected for elementary flight training at Sand Point, Washington.

TO SPECIALIZE in ground transportation and the storage of airplanes, the Airplane Transit Service has been established in Oakland by A. J. Angeli and Fred Krumerlander. The company plans to cover the entire state of California. A large warehouse has been leased near Oakland Municipal airport. Specially designed trucks will be used in transporting planes.

THREE speedboats, one capable of carrying 75 passengers and a ton of mail, are being equipped for use in the proposed service between Oakland Municipal Airport and the San Francisco business district. The largest boat is powered with two 400-horsepower Liberty engines and has a high speed of 45 miles per hour. Service is scheduled to start in February.

SEVENTY-FIVE airplanes, representing nearly every Army flying field in the west, flew to Oakland and the San Francisco Bay region, the day of the Stanford-Army football game, according to records of the various airports. Rockwell Field, San Diego, had the largest representation. Major Carl Spatz was in charge of the delegation from that field.

NEW records in airplane operations at the Oakland Municipal airport were reached during 1929 by the following totals for the year, according to a report issued by the Board of Port Commissioners: passengers, 52,900, an increase of 12,209 over 1928; landings, 82,316, an increase of 15,884; student flights, 13,009, an increase of 4,712.

TO FACILITATE the gathering of reports, the jurisdiction of the Oakland Municipal Airport weather bureau has been extended to Reno on the transcontinental airway. All points east of Oakland were formerly under the jurisdiction of the Salt Lake City bureau. Under the change all reports from outlying stations are to be gathered at the Oakland airport weather bureau, and hourly broadcasts of the Oakland-Reno airway will be issued from that station.

STOCKTON

[R. GRIGSBY]

THE new airport, built and owned by the Oranges Brothers two miles north of Stockton, Calif., is rapidly nearing completion. The field consists of 320 acres bordered on the west side by the Lincoln Highway, and on the east by the Western Pacific Railroad. A hangar 420 feet long has been erected, with room for fifteen planes. Electric lights, water, gas, oil, air, telephone, and rest rooms are provided. Bermuda grass, alfalfa, and shrubbery have been planted, and the grounds already present a pleasing appearance. The land, which is a heavy black soil has been cleared of all trees and obstructions, and has been leveled. A large area in front of the hangars has been oiled and rolled. One oiled runway 2,000 by 100 feet has been rolled, and another running diagonally northwest by southeast is being built. It will be 4,000 by 150 feet with an oiled surface.

Complete lighting equipment will soon be installed and the parking space for automobiles is being graveled. The owners, Ed and Les Oranges, have successfully conducted a large garage in Stockton for the past 12 years and are veteran fliers.

HENRY NORDWICK, manager of Stockton Municipal Airport, announces that approximately $12,000 has been alloted to build an administration building, buy additional land, and make sufficient improvements to give the field a class A rating. The floodlights at the port have been lowered to reduce glare in landing. The Stockton Field is in good condition, and visitors can land there safely, night or day.

WASHINGTON

[C. M. LITTELJOHN]

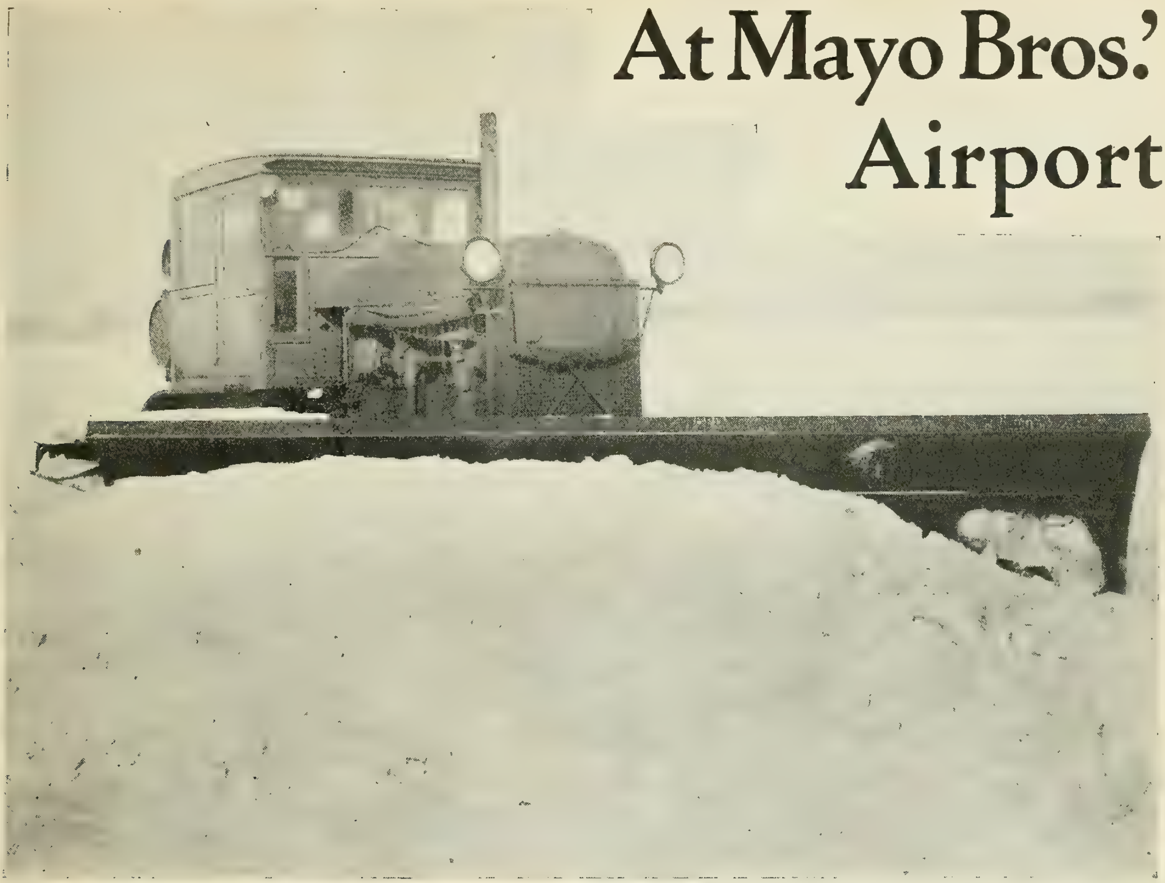
THE Boeing Airplane Company of Seattle, Washington, recently issued a report covering activities in 1929 and comparing products manufactured previously by the company with those delivered in 1929. The report summarized the development in the design and construction of commercial and military planes manufactured by the Boeing company. Coincident with the report, the company announced that all airplanes manufactured in the future will be bonded, shielded and wired throughout for radio installations Factory space utilized by the company has been increased to 300,000 square feet, according to the report.

Included in the planes manufactured and distributed by the company in 1929 is Model 100, a high speed, single-place sport plane designed primarily for military use, stripped of combat equipment and redesigned for commercial purposes. Model 95 is a mail plane built to carry 1,600 pounds of cargo. The company also produced Model 40-B4, a four-place mail plane powered with a Pratt and Whitney Hornet engine. During the year the Boeing organization began production of Model 80-A, the trimotor transport which was a development of the original Model 80. Model 80-A carries eighteen passengers as compared to the twelve-passenger capacity of the original model, and weighs ninety-five pounds less than

(Continued on next page)

Boeing flying boat, powered by a Pratt and Whitney Wasp engine, the high speed of which has been increased to 135 m.p.h. by a propeller change

At Mayo Bros.' Airport



When the Mayo Bros. of Rochester, Minn., built their airport and purchased planes for transporting emergency cases, they laid sound plans for Winter, as well as Summer maintenance.

This "Caterpillar" Sixty Tractor, equipped with wide, reversible backfiller blade and snow plow, drives snow off the runways in Winter, spreads material, levels high spots, fills low spots in Summer. Thus does the "Caterpillar" Tractor with its powerful traction preserve unhindered flying service 12 months a year, *better, quicker, cheaper.*

Prices—f. o. b. Peoria, Illinois

TEN	$1100	TWENTY	$1900
FIFTEEN	$1450	THIRTY	$2375
SIXTY	$4175		

Caterpillar Tractor Co.

PEORIA, ILLINOIS *and* SAN LEANDRO, CALIF., U. S. A.
Track-type Tractors , Combines , Road Machinery
(There's a "Caterpillar" Dealer Near You)

CATERPILLAR
REG. U. S. PAT. OFF.
TRACTOR

(*Washington News continued*)

the twelve-passenger plane.

For the purpose of demonstrating progress in the design of military planes manufactured by the company, the report compared a Navy pursuit plane produced by the company and delivered in 1928, with that delivered in 1929. Having the same capacity for crew, fuel, armament carried, deck arresting gear and flotation gear equipment, the latter model carried additional weight in oil, equipment, engines and accessories. In addition, designers increased the high speed, the rate of climb and the service ceiling of the plane. The company also developed an oleo type arresting gear for the Navy in 1929.

EXTENSIVE development of the Tacoma, Wash., airport in the future is provided for by a special committee of business men supervising the opening celebration. It is planned to make the Tacoma airport a community center. In the ultimate development there are to be picnic grounds for the accommodation of many hundreds, space for athletic contests and games, links for golf, and extensive bleachers.

LOUIS PROCTER, national scale model airplane contest winner for 1929, was recently added to the staff of the Boeing Airplane Company at Seattle as a model airplane builder. Procter, as winner of the scale model event in the national contest held at Detroit in June, received the AERO DIGEST prize of a trip through Europe.

EXPANSION of the airport at Vancouver, Wash., will soon be under way, according to the plans of local civic officials. Ten new hangars are to be built at the flying field, and the city council is furthering other improvements. Eight of the new hangars will be for medium-sized planes, and two for large cabin transports.

WITH final work nearing completion on the new Aeronautics Hall of the University of Washington at Seattle, classes in aviation subjects were scheduled to open the latter part of January at the Seattle educational center. Prof. E. O. Eastwood, as director of aeronautics, will have charge of instruction at the new building, which has equipment for the study of the latest aviation developments.

DR. ALEXANDER GRINSTEIN, a Seattle physician, recently organized a $75,000 corporation, fully subscribed, known as the Pacific Aeronautic Research Foundation, which will sponsor a 4,800-mile nonstop flight from Seattle to Tokio. Bob Wark, a Seattle flier, plans to attempt the flight next May if weather conditions are favorable. An order for a new plane for the flight has been given by the foundation to the Emsco Manufacturing Company of Downey, Calif.

ONE of the latest plans for air service between Seattle and the East is the plan for direct air service between Seattle and Minneapolis by the Inter-Citiair Express recently incorporated at Olympia, Wash. The newly formed corporation, backed by capital of Yakima, Wash., has completed the purchase of the inter-city division of the Alaska-Washington Airways, Inc. J. L. Carman, Jr., president of the Alaska-Washington Airways, has been elected president of the Inter-Citiair firm. T. V. Arnreiter has been made business manager and Don Phillips is in charge of operations.

THE War Department recently ordered the 15th Photographic Section of the Army Air Corps stationed at Crissy Field, California, to make an aerial photographic survey of the Columbia River from Pasco, Washington, to the Canadian border. The photographs obtained will be used by the United States Geographical Survey for making maps of the area.

A LANDING light which gives a forty-five per cent increase in illumination and draws approximately half the load required for the ordinary equipment has been developed by the Boeing Airplane Com-

(*Continued on next page*)

RUSSELL PARACHUTE COMPANY'S
SPECIAL PRICES ON
STANDARD DESIGN
WIND CONES

Large and durable, with reenforced grommets for lacing. Made of specification cotton material.

SIZE:	Natural White	Orange Yellow
8 ft. long by 20 in. dia. at large end.	$6.00 Each	$7.50 Each

Size: 12 ft. long by 36 in. dia. at large end

GENUINE RUSSELL PARACHUTE
SILK MUFFLERS FOR COLD WEATHER

A useful addition to any man's wardrobe. Soft, comfortable, dressy and warm. It really keeps out the cold. Generous size, 2½ yds. long by 30 ins. wide. Made of seamless, first-quality natural white Parachute silk.

$6.00

Same quality and size, with cross seams **$3.00**

Satisfaction Guaranteed
Write Direct To
RUSSELL PARACHUTE CO.
1202 Kettner Blvd. San Diego, Calif.

DISTINCTIVE BEACON
FOR AIRPORTS AND AIRWAYS

— We Stress —

3 HORIZONTAL BEAMS
With 40 Color Combinations

1 VERTICAL BEAM
Giving Fixed Ceiling Light

LONG FLASH LENGTH
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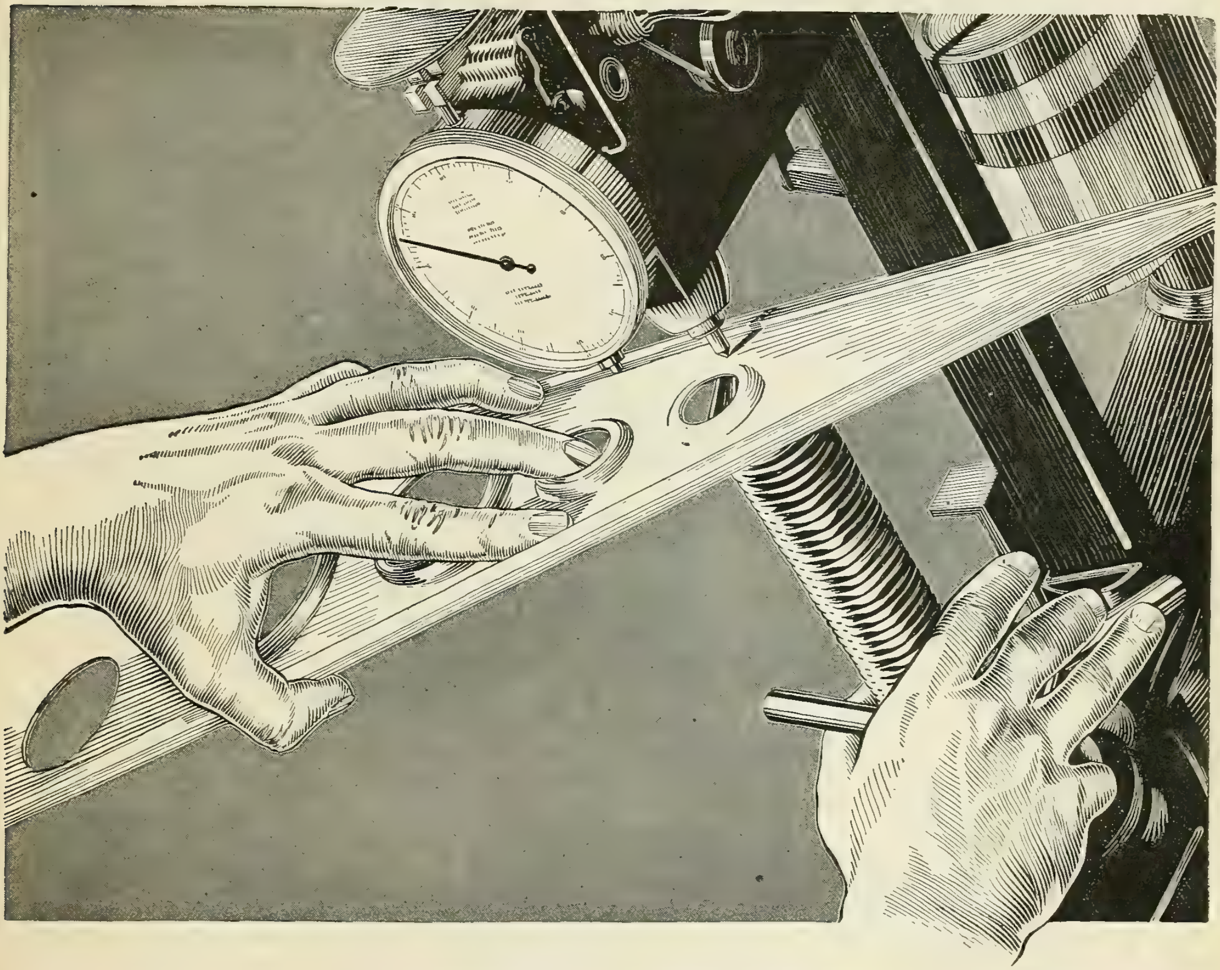
APPROX. 10,000,000 C. P.
All from 1 Lamp, 4-30 in. Intensifiers

AERONAUTICAL PRODUCTS CORP.
530 WEST 6TH St. - - - LOS ANGELES, CALIF.

FIRST AROUND THE WORLD



Not how many, but how well!

With Douglas, production is not a matter of how many planes can be manufactured. Rather, Douglas is concerned with how well each plane can be built!

Upon the attainment of this single objective, Douglas concentrates the entirety of its resources. Engineers, craftsmen, machines and materials capable of producing to the Douglas standard alone are selected to assume the responsibility of fashioning Douglas planes.

Each bit of raw material and every finished part is carefully inspected for quality and accuracy that stands as the difference between perfection and mediocrity. Only through such exceeding care can Douglas always assure that every plane in every flight will write in the skyways the fact that . . .

Douglas Means Dependability

DOUGLAS
AIRCRAFT CO.
INCORPORATED
Santa Monica California

(*Washington News continued*)

pany of Seattle, Wash. The new lamp is slightly larger in size than the ordinary type and retracts into a comparatively thin wing without requiring projections for housing. The Boeing company will install the new type light on the wing tips of transport and mail planes operated by the company.

NORTHWEST

[F. K. Haskell]

THE Gorst Air Transport, operating the air ferry between Seattle and Bremerton, recently made a reduction in fares, cutting the rate from $2.50 to $2. Approximately 20,000 passengers have been carried on this air trip during the past six months.

THE new Breese mail monoplane built by the Breese Aircraft Corporation of Portland, Ore., was recently put through its first test flight. Powered with a Wright 300-horsepower engine, the craft with Vance Breese at the controls took off at Swan Island airport, and in less than one minute had climbed to an altitude of more than 1,000 feet. The plane later attained a speed of 150 miles per hour. The craft varies from the regular monoplane in that the use of a narrow center section makes general visibility possible.

A BID of the Empire Electric Company of Pasco, Wash., of $23,446.50 was the lowest of five submitted for the installation of 13 aviation beacons on the Pasco-Spokane section of the Columbia Gorge airway.

SEATTLE, Wash., is now the headquarters of a new commercial aviation company, with the recent formation of the Alaska-Washington Airways Consolidated, which has been incorporated with a capital of $1,000,000. The new corporation is a holding company to finance and control the operations of the three existing units of the Alaska-Washington Airways: the Alaska-Washington Airways, Ltd., of British Columbia, the Alaska-Washington Airways of Puget Sound and the Alaska-Washington Airways of Alaska.

The Alaska-Washington Airways of British Columbia was organized in September to operate the seaplane service between Victoria, Vancouver and Nanaimo, Canadian laws not permitting an American company to operate between Canadian cities. H. B. Olson of Victoria, president of the Gray-Line Tours, is the principle stockholder and president of the company.

The Puget Sound unit began operations between Seattle and Victoria August 19 and later extended service to Tacoma and Olympia. A direct service from Seattle and to Vancouver has also been opened up.

CAPT. L. G. DEVANEY has taken over the duties of supervisor of operations of West Coast Air Transport system at Portland, Ore., suceeding Capt. W. C. LaFollette, who has taken charge of the Varney Air Lines at Pasco.

ALL airplanes now flying without a federal license in Oregon must have by February a state license and an airworthiness certificate issued by the Oregon State Board of Aeronautics, according to a recent official announcement. Penalty for failure to obtain either the license or certificate will be indefinite grounding.

Seven rules and regulations were adopted by the Board, according to Lieut. Archie F. Roth, chairman, and were approved by Oregon's new leader, Governor Norblad. All ships flown commercially or for pleasure must be inspected by one or more members of the board before a certificate will be issued. The board's office will be at Swan Island Airport, Portland.

HAWAII

A HEATH parasol monoplane was recently constructed by Glenn Belcher of Honolulu in the basement of his home. Mr. Belcher flew the light plane to John Rodgers Airport, Honolulu, T. H., where he has obtained hangar facilities and maintains his plane.

Glenn Belcher and his Heath monoplane at Rodgers Airport, Honolulu, T. H.

Luke Field Private Wins Light Plane Design Contest

A PRIZE of $500 offered by Col. R. Potter Campbell for the best design of a light primary training and sport airplane was awarded recently to James P. Rigby, a private in the United States Army stationed at Luke Field, Hawaii. The contest was held under the auspices of the *Scientific American.*

The plane designed by Rigby is a two-place biplane powered with a Cirrus Mark III engine, and has a fabric-covered fuselage of low carbon steel framework. The wings are of wood and fabric with built-up box spars. According to the designer, the ship has a high speed of 95 miles per hour, a landing speed of 39 miles per hour, a cruising radius of five hours, a rate of climb at sea level of 693 feet per minute, and a service ceiling of 14,000 feet.

An airplane design submitted by F. R Huep, an aeronautical engineer of Des Moines, Iowa, was awarded second prize. He submitted plans for a low-wing, cantilever two-place monoplane, convertible with a slight addition in weight, from an open to a closed-cockpit type of plane.

WYOMING

[I. R. Alexander]

MEMBERS of Wyoming's first flying class are making solo flights over Airport Cheyenne, Cheyenne, Wyo., and are preparing for examinations for certificates from the United States Department of Commerce. The class includes Mrs. Claudia Hopka, Robert Fitzmorris, Herbert Rutherford, Tom Freeman, J. Alexander, Phil Bradshaw, Frank Asher, Budd Betts, Lloyd Collenburg, Charles Hirsig and Ernest Nath.

AN IMPROVED municipal airport will be a reality in Sheridan, Wyo., soon. As soon as spring weather permits work will begin on an improvement program which has been made possible through substantial subscriptions made by civic-spirited citizens. A 200-acre tract has already been purchased by the city and this site will be improved with funds coming from donations. Those interested in the project predict that approximately $20,000 will be forthcoming for the work on the new airport.

UTAH

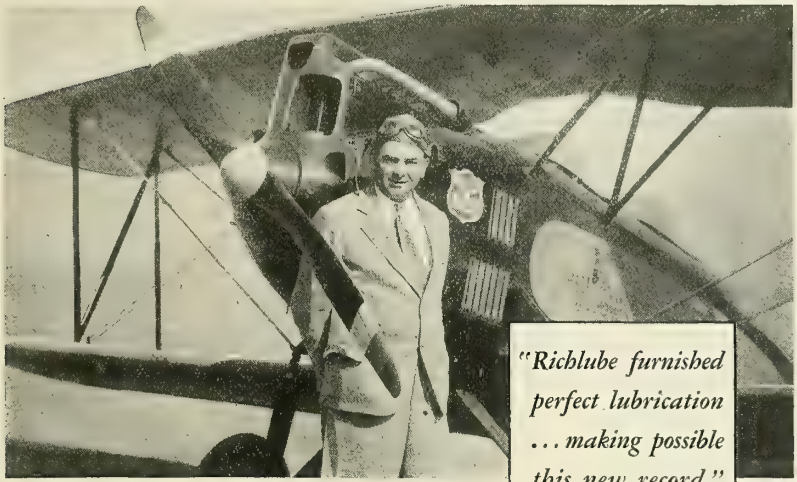
[G. Perrin]

PROVISION was made recently in Salt Lake City's tentative airway budget for 1930 to build a $12,000 administration building at the local municipal airport. "With 1,200 airports already in use and 1,000 more in course of construction," reports Harry L. Finch in commenting on the provision, "a progressive attitude toward the airport must be maintained. Salt Lake's airport compares favorably with many airports in the United States in its physical condition." The need for an administration building is emphasized in the budget report.

The Salt Lake airport is handling mail on the four airlines operating through the city—Boeing Airways, Inc., Western Air Express, Varney Air Lines and National Parks Airways. Over 9,000 pounds of mail were handled by the four lines recently in one day's work. New rules and regulations

(*Continued on next page*)

TEX RANKIN sets new record of 19 outside loops



"Richlube furnished perfect lubrication . . . making possible this new record."

Tex Rankin

BRINGING his Cirrus-engined Great Lakes plane into a series of breath-taking dives, Tex Rankin, dashing flying ace of the Northwest, completed 19 perfect outside loops at Portland, Oregon on January 7th, setting a new official N.A.A. world's record for outside loops.

Rankin chose Richlube Motor Oil to lubricate his plane for this most dangerous and difficult feat. In spite of the terrific strain on the ship and the excessive R.P.M's at the bottom of the dives, the engine suffered no ill effects whatever due to the perfect lubrication.

This new record is a tribute to the courage and flying skill of Rankin, to the staunchness of the plane and to the perfect lubricating qualities of Richlube Motor Oil. Rankin also used Richfield products when he flew from Canada to Mexico in a Great Lakes plane last August, establishing a new economy record of 18-⅓ miles per gallon with Richfield gasoline.

Use Richfield Gasoline and Richlube Motor Oil in your own flying equipment or car . . . available at airports and service stations throughout the country.

100% PURE PENNSYLVANIA OIL
RICHLUBE
AVIATION MOTOR OIL

RICHFIELD
AVIATION GASOLINE

RICHFIELD

(Continued from preceding page)

for the airport were announced following a conference between Dillard Hamilton, inspector of the aeronautic branch of the Department of Commerce, and Gilbert T. Rich, port manager.

Construction of an airport repair shop at Salt Lake's airport will begin in the near future, according to Frank P. Bell, general manager of Aircraft Industries, Inc., of Oakland, Calif.

MEMBERS of the University of Utah Aviation Club recently completed its one hundred and eightieth successful flight in a German type Zoegling primary glider which was constructed by members of the club in the shops of the University. The club has started the construction of a soarer type of glider which will have a wing spread of 45 feet with 200 square feet of lifting surface. The soarer was designed by members of the engineering class of the University and will be flown by club members who graduate from the primary ship.

A SITE on Utah Lake favored for the permanent municipal airport planned by Provo, Utah, is based on a recent survey of all suggested sites made by Alvin O. Preill, of the Federal Bureau of Aeronautics. A runway, three-quarters of a mile long and 500 feet wide, to run into the prevailing wind and a diagonal runway are suggested. The site will have no obstructions. Erection of a steel tower for a wind and beacon light will be started.

RETENTION of $5,000 in the tentative budget for the Ogden, Utah, airport lighting improvements has been urged by Ross Gwilliam, chairman of the aviation committee of the Ogden Chamber of Commerce. Equipment for the lighting of the airport has arrived. It consists of border lights, hazard lights, beacons and other facilities for night flying.

NEW MEXICO

[B. T. BLISS]

CONSTRUCTION on a new $20,000 hangar has started at the Albuquerque, New Mexico, municipal airport. Plans call for a structure 100 by 120 feet of brick and steel construction, which is to be completed within the next two months. The new hangar will be used as a show room for Travel Air planes for which the Albuquerque Aircraft Holdings, Inc., is distributor for the central and northern parts of New Mexico. The old hangar will be used as a storage room. E. J. Marchant is the contractor.

THE $50,000 building program at the Albuquerque Western Air Express Airport is nearing completion. The brick and stucco station of Spanish pueblo style has been opened and the large hangar is practically finished. The new hangar is large enough to house two Fokker 32-passenger planes, in addition to a number of smaller ships. Edward Lembke is constructing contractor in charge. General improvements on the field are planned.

ALBUQUERQUE became the southern terminus of the Mid-Continental airline from Denver during January, replacing El Paso, Texas. Demand for service between Denver and Albuquerque to connect with the Western Air Express has been substantial, while that between El Paso and Albuquerque has not been sufficient to warrant continuing the service, according to William L. Franklin, Mid Continental passenger agent.

DURING the past two months airports have been established in New Mexico at Carlsbad, Socorro, Farmington Clayton and Roswell. Roswell in southeastern New Mexico is the latest city in the state to construct a well equipped landing field. The new airport reports a good business, with all indications of rapid expansion.

THE year 1929 was a banner year for Albuquerque in aerial growth. Beginning the year without even an airport the city had two first class ports and three airlines at the year's close. At the Albuquerque Airport more than $100,000 was spent in construction work, other than T.A.T. projects. Construction included a hangar, administration building, club house, installation of night lights and oiling of the runways. Construction at the Western Air Express airport included a new hangar and a passenger station. The new lines serving the city are the T.A.T., Western Air Express and Mid-Continental Airlines.

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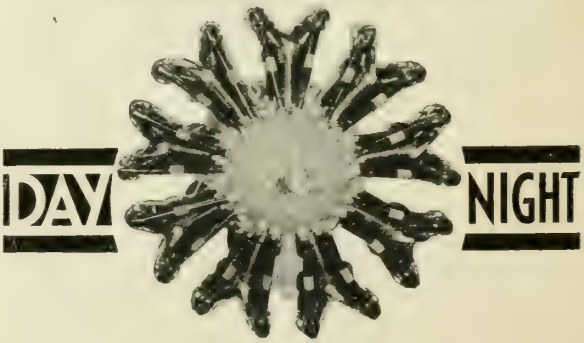

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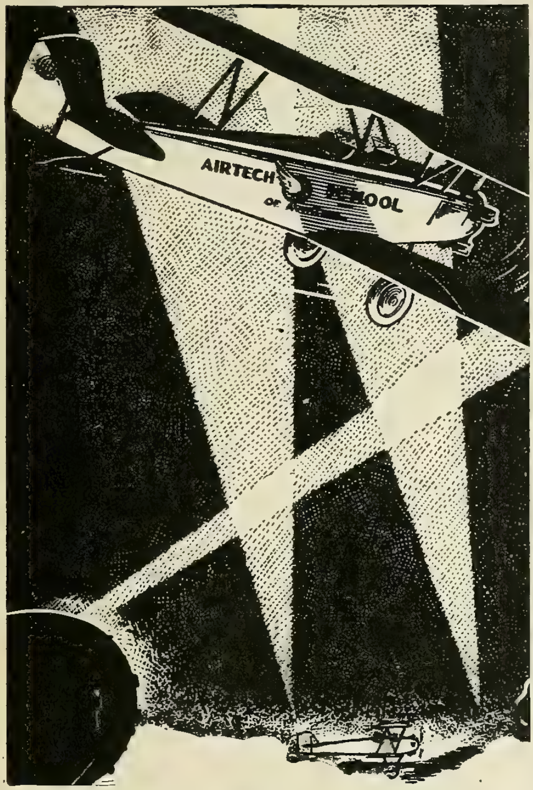

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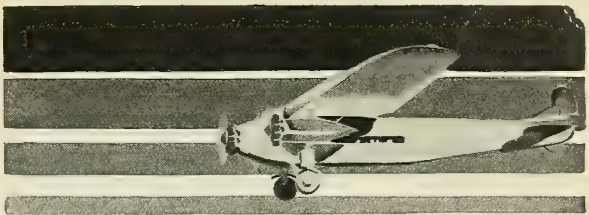

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AERONAUTICAL INDUSTRY

SAFETY IN FLYING INCREASES

An increase of 100 per cent in the number of miles flown for each accident in civil aeronautics in the United States for the first six months of 1929 over the same period in the previous year is shown in the semi-annual report of aircraft accidents made public January 18 by Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

A total of 56,201,338 miles was flown by civil aircraft in the United States between January and June, 1929, in air transport and miscellaneous operations—more than three times as much as during the first six months of 1928. In scheduled air transport operation for this period, the report shows there were 9,201,338 miles flown with nine fatal acidents reported, the mileage flown for each fatal accident being 1,022,371. For the same period of 1928 there were 4,484,612 miles flown and five fatal accidents, the miles per fatal accident being 896,922. Considering all classes of accidents the miles flown per accident in scheduled air transport operations for the first half of 1929 totaled 153,306, as there were sixty accidents. For the corresponding period in 1928, the total number of accidents reported was thirty-five, which placed the miles per accident at 128,132.

With a total of 47,000,000 miles flown in miscellaneous operations in the 1929 period and a total of 118 fatal accidents, the miles flown per fatal accident in this class of flying amounted to 398,305, while in the same period in 1928 the total mileage was 12,000,000, the number of fatal accidents was 92, and the miles flown per fatal accident numbered 130,435. The total number of all classes of accidents reported in the 1929 six-month period in miscellaneous operations, was 714, which brought the miles per accident in miscellaneous operations to 65,826. This mileage per accident was more than twice that for the same period in 1928, as the records show but 30,380 miles flown per accident in that period. This latter figure is based on a total number of accidents for that period of 395.

Carried out further to take in the total mileage flown in all classes of aircraft operations for each fatal accident, the figures show there was one fatal accident during the first half of 1929 for every 442,530 miles flown. The total number of fatal accidents for this period was 127, while the total miles flown was more than 56,000,000, as previously shown. For the corresponding period of 1928, however, the number of fatal accidents in all classes of operations was 97, the miles flown were 16,484,612, giving a total mileage per fatal accident in all classes of flying of 169,944.

From the standpoint of mileage flown per accident in all classes of civil aircraft operations and for all classes of accidents throughout the United States for the first half of 1929, the figures show an increase of almost 100 per cent over the corresponding period of 1928. There was a total of 774 accidents in the first six months of 1929, which placed the total mileage per accident at 72,612. For the first half of 1928, there were 430 accidents of all kinds, and a total mileage of 38,337 per accident for all classes of operation.

Direct comparisons only were made between the mileage flown and the number of accidents in the first half of 1929 and the first half of 1928 because weather conditions during the last six months of the calendar year are more favorable for flying than during the first six months. The Aeronautics Branch believes that due to the shortage of field personnel for carrying on the work, there doubtless were some unreported accidents in 1928, in which event, the increase in mileage flown per accident for 1929 over 1928 would be even greater than shown in this report.

The causes of the accidents are divided into four major classifications—personnel, power plant failures, airplane failures, and miscellaneous. A fifth category is given over to undetermined and doubtful causes.

The largest percentage of the accidents was attributed to personnel, the total being 59.04 per cent. The net largest cause was credited to power plant failures, which amounted to 18.08 per cent. Airplane structural failures contributed 8.80 per cent, and miscellaneous, 9.35 per cent. In the miscellaneous class, weather was credited with 5.02 per cent; airport and terrain, 2.78 per cent; darkness, 0.51 per cent and other causes not falling under the general classifications, 1.04 per cent. The percentage of undetermined and doubtful causes was 4.73 per cent.

The accident report is based on the findings of the Accident Board of the Aeronautics Branch. This board investigates and determines the causes of all civil aircraft accidents; analyzes all accidents reported from the field and reduces them to their causation factors expressed in percentage. Printed copies of the complete report, giving comparative statistics and analyses of accidents in civil aeronautics for the years 1927, 1928 and the first six months of 1929 are available upon request to the Aeronautics Branch, Department of Commerce.

PLANE REPAIR BASES TO BE INSPECTED

Plans for inspectors of the Aeronautics Branch of the Department of Commerce to inspect and grant approvals to aircraft repair stations were made at a recent four-day conference between inspectors and officials of the federal government. Provisions for this inspection were included in regulations previously in effect, and the present plan for this work is the first step toward carrying out the regulations.

According to the plans agreed upon at the conference, approval of repair stations in the future will be based upon ability to handle the repair of licensed aircraft and upon the agreement of the station with the manufacturer as to the furnishing of data which would permit repairs to be based upon the original specifications. The system is designed to eliminate the necessity of sending a stress analysis and data on the work to be done to the Department of Commerce for approval.

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its field in 1930 beyond a question of doubt

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N.Y.R.B.A. COMPLETING PLANS FOR INTERNATIONAL SYSTEM

ORDERS for $2,500,000 worth of multi-motored operating equipment and immediate installation of a net-work of seventeen radio control stations have been added to construction orders involved in forty ports of call on the New York Rio Buenos Aires Line by William P. MacCracken, Jr., chairman of the airline organization. These orders complete two years of pioneer work that has gone forward on the South American continent for the establishment of a fast air mail, passenger and express system over the eastern trade route between the industrial and commercial centers of Argentina, Brazil and the United States.

Marking Mr. MacCracken's initial activity in his new position as chief executive officer of the 11,000-mile air transport project, New York Rio Buenos Aires Line, Inc., has placed orders which will increase its fleet to twenty-seven multi-motored transports and eight single-engined planes. The company plans to serve fifteen Latin American countries on a direct route to the United States. The first test schedules over the company's line between Chile, Argentina, Brazil and Florida will be run through on February 18, Mr. MacCracken stated. Thus will be put into operation the world's longest airline and America's first major commercial seaplane operation.

Behind the operation of its system, New York Rio Buenos Aires Line has secured prior contracts from the governments of Argentina, Brazil, Chile, Uruguay and Venezuela, which control three-quarters of the air mail activity between South America and the United States. With this formidable foundation the company has put into operation 3,500 miles of airlines serving Argentina, Chile, Uruguay, Bolivia and Brazil as far as Rio de Janeiro. The line northward through the Guianas and West Indies to Florida is being put into test operation division by division.

The newly ordered planes, which will cost over $2,315,000, call for a major fleet of fourteen twenty-passenger flying boats to be built by the Consolidated Aircraft Company especially for South American service. The big boats are powered by twin Hornet engines, aggregating 1,150 horsepower. They provide accommodations for twenty passengers and crew, are completely radio equipped and have a high speed of 135 miles per hour.

To be used for express service over the seven main divisions between Argentina and the United States, the flying boats will be backed up with a fleet of nine twin-motored Sikorsky amphibions. Over the 2,000-mile net-work of airways now operated by the company between Argentina, Uruguay, Bolivia and over the trans-Andean airline to Santiago, Chile, a fleet of four trimotored fourteen-passenger Ford transports are in regular operation in addition to a fleet of amphibions on the water routes between Buenos Aires and Montevideo.

William P. MacCracken, Jr.

In furthering the company's project to provide a faster transport service to the United States Mr. MacCracken has ordered a fleet of eight fast mail planes. Included in the order are two Lockheed Vega Air Express planes and six Fleetsters, new all-metal mail planes capable of a speed of 175 miles per hour.

At the present time the company has flown a fleet of fourteen big transport planes over the 9,000-mile route down the eastern coasts of North and South America. Four Ford trimotor transports, seven Sikorsky amphibions and the first four Commodore flying boats are now in South America being assembled over the long route for inauguration of service northward to the United States. Additional equipment is to be delivered in New York at intervals of fifteen days until the entire fleet is complete.

Dr. Zahm Appointed to Guggenheim Chair of Aeronautics in Library of Congress

DR. ALBERT F. ZAHM recently assumed his duties in the Guggenheim Chair of Aeronautics at the Library of Congress, to which he was appointed by the Daniel Guggenheim Fund for the Promotion of Aeronautics. The chair was endowed by Harry F. Guggenheim, and $140,000 was appropriated for the purpose of organizing a complete aeronautical library for research purposes.

Dr. Zahm was formerly director of the aerodynamic laboratory of the Navy Department, in which capacity he served from 1916 until his appointment to head the aeronautical library at Washington, D. C. During the World War he supervised the scientific laboratory of the Curtiss-Wright factory, and when the aviation division of the Navy Department was created he was appointed chief of the aerodynamic laboratory at the Washington Navy Yard. In 1910 Dr. Zahm was associated with Alexander Graham Bell and General George O. Squier in plans for the preservation of the Langley Laboratory at the Smithsonian Institution, and in 1913 he assisted the Smithsonian Institution in preparations for flight testing the original Langley airplane at the Curtiss factory.

1929 PRODUCTION FIGURES FOR PLANES ANNOUNCED BY A.C.C.

AMERICA'S aviation industry reached the highest peak in its history with the production of over 6,000 planes during 1929, according to the annual report of the Aeronautical Chamber of Commerce of America, Inc., made public January 22. The report will be included in "The Aircraft Year Book For 1930" to be distributed February 15 by the organization.

The report was based on the statements of niney-six major aircraft manufacturers who reported to the Aeronautical Chamber of Commerce. These manufacturers produced 6,034 commercial and military planes with a total retail value, without engines, of $44,457,300.60. Planes designed for commercial use alone totaled 5,357 with a value of $33,624,756.60. Six hundred and seventy-seven military planes were produced with a total value, less power plants, of $10,832,544.

Commercial production increased fifty-one per cent over that for 1928, as 1,815 more airplanes were manufactured during 1929 than during the previous year. While the percentage of increase in units produced was high, the sharp rise in valuation was higher. The valuation without engines, for all commercial planes increased ninety-six per cent over 1928, aircraft manufactured in 1929 showing an increase in valuation of $16,430,458.60 over the previous year.

Military production during 1929 experienced a decided slump, falling four per cent under the 1928 figures. Total production, despite the military slump, increased twenty-seven per cent over 1928.

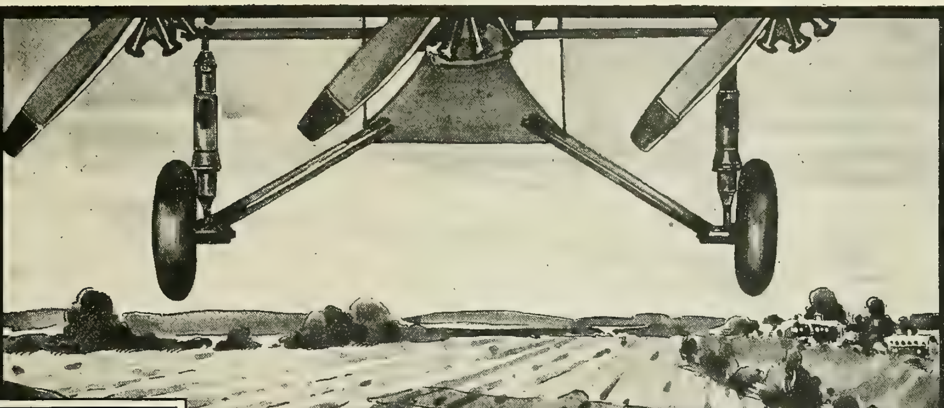
Analyzing the production reports of the ninety-six major aircraft manufacturers, the report shows that open cockpit biplanes led in the number produced as to type, with closed cockpit monoplanes second. Of all types produced during 1929, amphibions showed the greatest increase over 1928. Amphibions increased 363 per cent, showing a marked interest in this type. Multi-motored monoplanes increased 207 per cent as compared to 1928 figures; and flying boats and seaplanes 190 per cent. Open cockpit monoplanes increased eighty-one per cent; closed cockpit monoplanes, eighty per cent; multi-motored biplanes, sixty per cent; and open cockpit biplanes, thirty per cent. The closed cockpit biplane decreased thirty-two per cent below the 1928 totals.

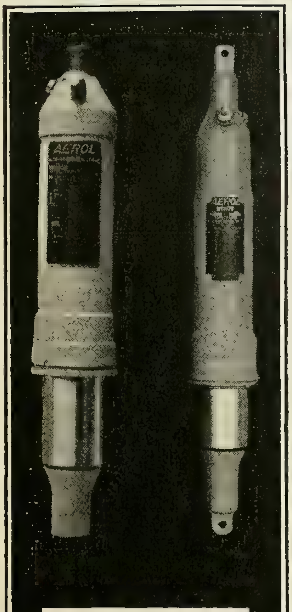
In 1928 there were 124 per cent more biplanes than monoplanes of all types, while in 1929, only fifty-one per cent more biplanes were manufactured. The ratio between biplanes and monoplanes was shown to be shifting rapidly in favor of the monoplane.

The average unit value, without engines, of airplanes produced during 1929 was $6,276.75, an increase of $1,422.25 more than in 1928, when the average unit value was $4,854.50. The marked increase in aircraft unit value was attributed to the larger num-

(*Continued on next page*)

Changing Emergency Landings from Crises to Incidents . . .





No part of an aeroplane is built from finer materials or with more care and precision than are Aerol Struts.

THE increased acceptance of flying rests upon better control of the plane while being landed under emergency conditions.

Such performance depends upon the plane's minimum flying speed and its landing gear. Manufacturers owe it to their future and to the pilot and the flying public to give their planes maximum landing performance.

That is why an increasingly large group of plane manufacturers have standardized on Aerol Oleo-Pneumatic Landing Struts. Their presence under the plane changes the vast majority of emergency landings from crises to incidents and establishes unequaled confidence on the part of the pilot.

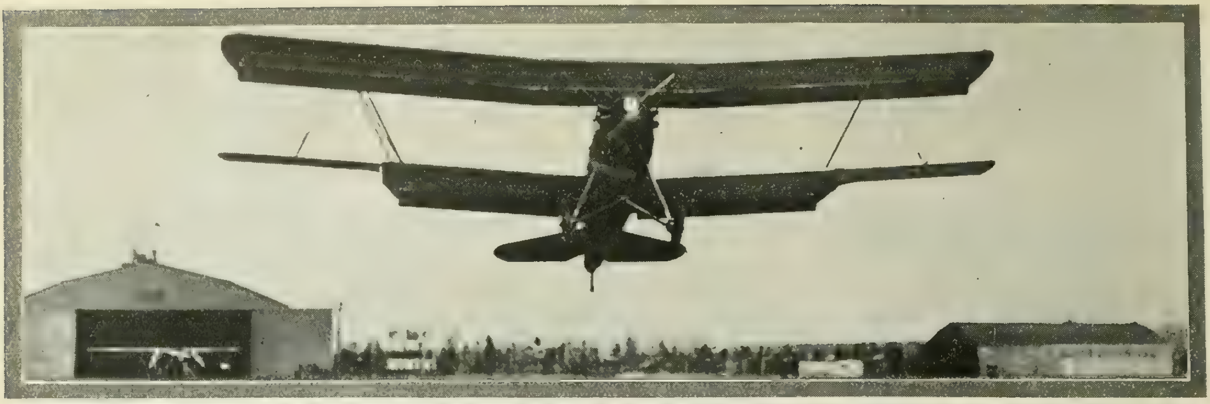
The telescoping action of these powerful and efficient cylinders absorbs initial impact, eliminates "crow-hopping" and shortens the roll.

Aerol Struts are made in the Military Type of extreme service and the commercial type for ordinary operation. Complete information will gladly be sent on request.

Aerol Struts are manufactured by The Cleveland Pneumatic Tool Company, Cleveland, Ohio.

ASK THE PILOTS WHO LAND ON THEM

AEROL *shock absorbing* **STRUT**



Curtiss Tanager, winner of the Guggenheim Safe Aircraft Comp tition $100,000 prize, taking off at Mitchel Field, L. I.

(Continued from preceding page)

ber of multi-engined transports, amphibions and flying boats with values ranging from $50,000 to $150,000, manufactured during 1929.

The aircraft production report is one of many concerning aviation which are included in "The Aircraft Year Book for 1930," compiled, written and edited by the Aeronautical Chamber of Commerce. A complete aircraft and engine design section chronology, appendix, and trade index are included in the 1930 book, which has more than 500 pages, 200 illustrations and 150 line drawings.

N.A.P.A. WAGE SURVEY

THAT pilots are giving serious thought to matters pertinent to the flying profession is indicated by the replies received in answer to a questionnaire sent out to all class "A" members of the National Air Pilots' Association. Carl F. Egge, executive secretary of the association, in summarizing the replies received, reported that pilots were of an almost unanimous opinion that 100 hours monthly should be the maximum amount of flying time flown by a pilot. There were many who favored a maximum of fifty to sixty hours per month, a large group who specified seventy-five to eighty hours monthly, and about six per cent who said that the maximum should be in excess of one hundred hours. These suggestions referred to single-engined ships on scheduled runs. It was agreed that for night flying the maximum number of monthly hours should be reduced, and that on daytime runs, using multi-motored ships with co-pilots, the time could be increased.

Most pilots agreed that the most satisfactory manner of compensation on scheduled routes is the base-plus-mileage system inaugurated in the early days of the air mail service. The base pay would be increased according to hours flown, the mileage would be modified by such hazards as rough country, mountains or water, and night flying would draw double day mileage rate, according to the concensus of opinion shown in the replies to the questionnaires. Seventy per cent of the replies to the questionnaire stated that a pilot operating a multi-motored plane should receive higher pay than those on single-engined ships.

CURTISS TANAGER WINS GUGGENHEIM PRIZE

THE first prize of $100,000 in the International Safe Aircraft Competition, organized and conducted by the Daniel Guggenheim Fund for the Promotion of Aeronautics, for the aircraft which would demonstrate the greatest advance in aerodynamic safety without loss of efficiency, was awarded on January 6 to the entry of the Curtiss Aeroplane and Motor Company. The Curtiss entry, the "Tanager," which successfully completed all of the qualifying tests, is described in the technical section of this issue.

Twenty-seven manufacturers entered planes in the competition, but only fifteen presented their planes for testing at Mitchel Field, Long Island, where the competition was held. The entry constructed by the British Handley-Page aircraft manufacturing organization passed the majority of the qualifying tests, but failed to obtain the minimum gliding speed of thirty-eight miles per hour as called for by the rules of the competition. In view of the fact that only the Curtiss entry passed all of the qualifying requirements, the final competitive tests which were originally planned to ascertain the winner on a point basis were not given.

The tests in the competition were started at Mitchel Field in June, 1929, and were conducted by the Fund's pilots, Thomas Carroll, formerly N. A. C. A. test pilot, Edwards W. Rounds, Naval test pilot, and Lieut. Stanley Umstead, Army test pilot at Mitchel Field. The field manager of the competition was Captain Walter Bender of the Army Air Corps.

GUGGENHEIM MEDAL FOR 1929 TO BE PRESENTED TO WRIGHT

FIRST award of the annual medal of the Daniel Guggenheim Fund for the Promotion of Aeronautics will be presented on April 8 to Orville Wright for the design and construction, with his brother, of the first successful engine-propelled airplane. The presentation of the medal, which is for the year 1929, will be made in connection with the celebration of the 50th anniversary of the American Society of Mechanical Engineers scheduled at Washington, the afternoon session on that date being devoted to the conferring of medals and other distinctions.

The Guggenheim fund in 1927 appropriated a fund to establish a medal to be awarded not oftener than annually for achievements in the advancement of aeronautics. The board of award has four members chosen by the American Society of Mechanical Engineers, four by the Society of Automotive Engineers, and one member each from England, France, Germany, Italy and Japan.

N.A.P.A. OFFICIALS FOR 1930 ARE ELECTED

THE National Air Pilots' Association recently announced the election of the following officers for 1930: Harry W. Huking, San Leandro, Calif., president; Henry J. Brown, Cleveland, Ohio, vice president and treasurer; and Elliott E. Underhill, New Brunswick, N. J.; Robert H. Fatt, Jr., Miami, Fla.; David L. Behncke, Chicago Ill.; Heber C. Miller, Portland, Oregon; and Charles R. Bowman, Los Angeles, Calif., governors for their respective districts.

Aeronautic Radio Research Committee Formed

FORMATION of an advisory committee on aeronautic radio research was announced on January 19 by Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. The committee was appointed as a practical means of determining how to achieve the highest degree of safety and reliability in air transportation, and will immediately undertake an initial survey of the aviation industry.

The following are the members of the committee: Harry H. Blee, chairman, Dr. J. H. Dellinger, Lieut. Comdr. D. B. Duncan, F. C. Hingsburg, H. J. Walls, Herbert Hoover, Jr., H. C. Leuteritz, Dr. Lewis M. Hull, George W. Lewis, Capt. H. M. McClelland, F. M. Ryan, Welsey L. Smith, and Ray Stearns.

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HASKELITE

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Tanager
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The winner of the recent international safe aircraft competition—the Curtiss Tanager—is an exclusive user of Haskelite, the blood-albumin plywood. Engineering data on this outstanding material sent on request.

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BOOTH 202
INTERNATIONAL AIRCRAFT EXPOSITION
ST. LOUIS

Glider Clubs and Pilots in the United States

TWENTY-SIX clubs were affiliated with the National Glider Association at the end of 1929, according to a recent report made by Donald F. Walker, manager of the association. In addition to the membership of the clubs, eighty-two individuals were members of the association.

The initiation fee for club membership in the National Glider Association was recently reduced from $25 to $5. According to the regulations of the association, affiliated clubs pay $1.35 per member per year during the first year of the club's affiliation, with minimum dues for the entire club of $25, in addition to the initiation fee. After the first year, the dues are $1 per member per year with a minimum of $25 in dues for the club.

The twenty-six glider clubs affiliated with the National Glider Association at the end of 1929 are as follows: Albatross Club, and Dearborn Glider Club, of Dearborn, Mich.; California Glider Club, San Francisco, Calif.; Glider Section of the Aeronautical Society of the University of Michigan, Ann Arbor, Mich.; New York Glider Club, Roslyn, L. I., N. Y.; Cleveland Glider Association, Cleveland, Ohio; Cincinnati Glider Club, and Cincinnati Girls' Glider Club, of Cincinati, Ohio; Breckenridge Glider Club, Breckenridge, Texas; Seattle Glider Club, Seattle, Wash.; Rochester Glider Club, Rochester, N. Y.; Kansas City Glider Club, Kansas City, Mo.; Jackson Glider Club, Jackson, Mich.; Portland Glider Club, Portland, Oregon; Highland Park Glider Club, Air Scouts of American Squad No. 1, A.B.C. Gliders, Detroit Club, all of Detroit, Mich.; Hillsdale Glider Club, Hillsdale, Mich.; Columbus Glider Club, Columbus, Ohio; Prop and Wing Glider Club, Chicago, Ill.; Fernandina Glider Club, Fernandina, Fla.; Washington Glider Club, Washington, D. C.; Bowlus Glider Club, San Diego, Calif.; Philadelphia Glider Club, Philadelphia, Pa.; and Lindsay High School Glider Club, Lindsay, Calif.

The National Glider Association is authorized by the National Aeronautic Association to license third and second class glider pilots and to supervise the examination of candidates for the first class license awarded by the Federation Aeronautique Internationale in the name of the National Aeronautic Association. To qualify for the third class license, the pilot must keep a primary or a secondary training glider in the air for thirty seconds in a flight straight down hill. For the second class glider license he must fly a primary or secondary training glider for one minute down hill, making a full right and full left, or "S," turn. For the first class or F.A.I. license, the candidate may enter any type of glider and fly it for five minutes at an altitude higher than the starting point.

There are at present two first class glider pilots in America, Lieut. R. S. Barnaby of the Navy Bureau of Aeronautics, and William H. Bowlus of the Bowlus Glider Club, San Diego, Calif.

A group of American glider fans launching a glider by shock-cord.

Nine members of the National Glider Association have qualified for second class glider pilots' licenses. They are Wallace Franklin, Lieut. R. S. Barnaby, William H. Bowlus, David M. Potter, Jr., William Van Dusen, James A. Moore, Albert E. Hastings, John C. Barstow, and Fred H. Rohr.

Thirty-two members of the association have qualified for third class glider pilots' licenses. They are Milton F. Stoughton, Vance Breese, Miss Maxine Dunlap, Ernest Langley, Faxon C. Atherton, Agne C. Lungren, Gilbert M. Watlers, Robert B. Evans, B. G. Reed, S. H. Bensky, I. R. Stoughton, J. A. Holt, J. D. Redding, Wallace Franklin, Lieut. R. S. Barnaby, Wm. H. Bowlus, Wm. L. Van Dusen, Kenneth H. Carr, John G. Barstow, Douglas D. Kelly, Earl R. Mitchell, Fred H. Rohr, E. M. Lacy, Jr., A. J. Coles, I. N. Lawson, Jr., James G. Nall, George L.McLeod, James A. Moore, Kenneth R. Aldrich, Elgin O. Marshall, Albert E. Hastings and Rufus T. Spaulding, Jr.

SCHEDULE OF COMING AERONAUTIC EVENTS

February 7-15. Second Annual New York Aviation Show, Aviators Post No. 743, American Legion, New York City, N. Y.

February 15-23. International Class-A Aircraft Show, St. Louis, Mo.

February 20-22. Second Annual Aviator's Reunion, Aviation Post No. 651, American Legion.

February 22-March 1. First Annual Bethlehem Aircraft Show, Bethlehem Municipal Airport, Bethlehem, Pa.

March 6-15. Second Annual Pittsburgh Aircraft Show, Pittsburgh, Pa.

March 12. Meeting of Aeronautic Division of A.S.M.E. with Engineering Society of Western Pennsylvania, Pittsburgh, Pa.

March 22-29. Eastern Aircraft Show, Convention Hall, Camden, N. J.

March 26-April 1. First Cincinnati Aviation Show, Music Hall, Cincinnati, Ohio.

April 5-13. Third All-American Aircraft Show, Detroit Board of Commerce, Detroit, Mich.

April 8-9. Two-day meeting of S. A. E. during Detroit Aircraft Show.

May 3-10. New York Aircraft Show, Aeronautical Chamber of Commerce, Madison Square Garden, New York City, N. Y.

May 19-22. Fourth National Aeronautic Meeting of A.S.M.E., Dayton, Ohio.

July 6. Beginning of International Transportation Exposition, Poland.

September 1-6. Fifth International Air Congress, The Hague, Holland.

November 27-December 14. Aeronautical Salon, Paris, France.

1930 Program of Aeronautic Division of A. S. M. E. Announced

THE Aeronautic Division of the American Society of Mechanical Engineers recently announced the program of activities scheduled by the body during 1930. The Aeronautics division of the Society has a membership of approximately 2,300.

The Aeronautic Division will conduct an inspection trip to the factory of the Curtiss-Wright Corporation at Garden City, L. I., on the afternoon of February 14. A technical meeting will be held in the evening at the Society's headquarters, Engineering Societies Building, New York City. On March 12 a meeting will be held at Pittsburgh, Pa., in conjunction with the Engineering Society of Western Pennsylvania and during the Pittsburgh Aircraft Show. The meeting will consist of three technical sessions at which ten papers covering technical aeronautical subjects will be read and discussed.

The Fourth National Aeronautical Meeting of the Society will be held at Dayton, Ohio, May 19-22, in coöperation with officials of Wright Field.

Organization of Women Pilots Formed

THE Ninety-Seven Club, first national organization of licensed women pilots, was organized recently, the name of the club representing the ninety-seven charter members who have affiliated with the organization. The membership constitutes more than three-fourths of the 126 women pilots licensed in the United States. The Ninety-Seven Club was organized for the purpose of furthering the interests of women pilots.

Heavy, rough castings are fashioned into machine parts.

Thousands of small and large units are finished to accuracy limits measured by tenths of a thousandth of an inch.

Many types of grinding machines employ many thousands of grinding wheels — reducing and finishing metals at lightning speed.

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SECOND ALL-AMERICAN AIR MEET

WITH a large number of visitors, including representatives of many foreign countries, and aircraft from all sections of the United States and Cuba, the Second All-American Air Meet was held at Miami, January 13, 14, and 15. The program of the meet included the dedication of the new Miami Municipal Dirigible Airport, which is located two miles north of the municipal airport. It is the only municipally owned dirigible airport in the United States. Many prominent officials participated in the dedication exercises, which preceded the opening races, while the Goodyear blimps *Defender* and *Vigilant* hovered in the background. Immediately following the dedication, the former ship was christened *Defender of Miami.*

While the meet did not approach the national meets in size, a better managed and more enjoyable meet has probably never been held. The weather was warm and clear and the events were run off promptly and on time and the entire program was completed with not an accident. Meetings were held in Miami during the meet by various organizations associated with aviation, including the Society of Automotive Engineers.

Many of the thrills furnished the spectators were the formation flying and maneuvers by Marine and Navy aviators. Extensive and thrilling individual exhibitions were provided by Lieutenants C. H. Little and Dave Rittenhouse, which included considerable upside-down flying. The Marine Corps was represented at the meet and an exhibition of three plane formation flying and stunting was furnished by Lieuts. W. R. Hughes, John S. E. Young and Christian F. Schilt in Curtiss Hawks during the afternoon of January 15. From Pensacola Rear Admiral A. W. Marshall led a formation of seven Curtiss Hawks and Vought Corsairs which were active during the meet. The Army was represented by Lieuts. C. H. Ernest and S. O. Ross from Maxwell Field, Montgomery, Alabama.

A number of ships belonging to the air unit of the Connecticut National Guard participated in the meet. Included in this representation were planes of the Vought Corsair, Curtiss Falcon and Douglas observation types.

Freddie Lund demonstrated that commercial fliers can stunt when he took his Taper-Wing Waco aloft and gave a thirty-minute exhibition, including an outside loop. The piloting of Dale "Red" Jackson, co-holder of the endurance refueling record, won the admiration of the crowd and also the largest amount of prize money awarded any one of the contestants in the events of the meet. Jackson was the winner of each of the races for 300-horsepowered cabin planes and Dick Stratham duplicated the feat by taking first place in each of the races for OX-5 powered planes. The skilful flying of Art Davis in his Waco racer won him much applause and the award of the second largest amount of prize money. Errett Williams also displayed much skill in racing in his Eaglerock Bullet.

One of the feature attractions of the meet was the jumping of fifteen parachute jumpers from the Sikorsky biplane *Northern Star* late in the afternoon of the 15th. Simultaneous with the jumps from the *Northern Star,* three jumpers left the Goodyear blimp *Defender* as it cruised over the field, placing eighteen jumpers in the air at the same time.

Immediately following the meet, forty-three of the planes that participated left on an air tour of the state. This tour included small one-day meets held at St. Petersburg, Tampa, and Orlando. Six days were required for completion of the tour, according to the schedule. Luke Christopher of the N. A. A. was observer of the flight; A. H. Heermance, tour chairman; and Bob C. Smalley, tour manager.

The following are the prize winners of the events in the Second All-American Air Meet:

EVENTS OF JANUARY 13TH

15-Mile Race for OX-5 Powered Planes

Place	Pilot	Plane	Time
1.	Richard Stratham	Bird	8:07
2.	Harvey Hughes	Challenger	9:01
3.	C. Descomb	Challenger	9:38
4.	Herbert M. Tooney	Amer. Eagle	10:27

15-Mile Race for 450 Cubic Inch Class

Place	Pilot	Plane	Time
1.	Errett Williams	Eaglerock Bullet	7:09
2.	Dale Jackson	Cessna	7:45
3.	C. M. Nash	Monosport	7:58
4.	R. W. Scott	Fleet	8:31

15-Mile Race for Open Cockpit Planes, 800 Cubic Inch Class

Place	Pilot	Plane	Time
1.	Arthur Davis	Waco	6:18
2.	Sam. R. Bigony	Travel Air	7:48
3.	Dr. J. E. Owen	International	7:50
4.	Errett Williams	Travel Air	8:10

15-Mile Race for Cabin Planes, 800 Cubic Inch Class

Place	Pilot	Plane	Time
1.	H. A. Little, Jr.	Monosport	7:18
2.	C. M. Nash	Monosport	7:44
3.	Dale Jackson	Cessna	7:48
4.	Wm. Van O'Brien	Robin	9:14

Special 15-Mile Race

Place	Pilot	Plane	Time
1.	Arthur Davis	Waco	6:23
2.	Errett Williams	Eaglerock Bullet	6:41
3.	A. B. McMullen	Travel Air	7:19
4.	J. E. Throppe	Waco	7:37

Bomb Dropping Contest

Place	Plane	Pilot	Distance from Circle
1.	Arthur Davis	Waco	32 ft. 0 in.
2.	Sam R. Bigony	Travel Air	51 ft. 3 in.
3.	Hugh L. Woods	Am. Eagle	90 ft. 3 in
4.	Geo. M. Keightley	Eaglerock	93 ft. 8 in.

Dead Stick Landing Contest

Place	Pilot	Plane	Distance from Mark
1.	Dr. J. E. Owen	Internat'nal	36 ft. 0 in.
2.	Errett Williams	Travel Air	50 ft. 6 in.
3.	Hugh L. Woods	Am. Eagle	123 ft. 2 in.
4.	W. L. Stribling	Travel Air	137 ft. 0 in.

Scenes at the Second All-American Air Meet: left, the Goodyear blimp, *Defender;* right, planes rounding a pylon

15-Mile Race for 300-Horsepower Cabin Planes

Place	Pilot	Plane	Time
1.	Dale Jackson	Cessna	5:59
2.	H. A. Little, Jr.	Monosport	6:21
3.	George Haldeman	Bellanca	6:37
4.	Wm. Alexander	Stinson	7:11

Events of January 14th

15-Mile Race for OX-5 Powered Planes

Place	Pilot	Plane	Time
1.	Richard Stratham	Bird	8:10
2.	Arthur Davis	Challenger	8:50
3.	W. F. Cummings	Challenger	9:14
4.	Park P. Read	Waco	9:21

15-Mile Race for 450 Cubic Inch Class

Place	Pilot	Plane	Time
1.	Errett Williams	Eaglerock	6:33
2.	Dale Jackson	Cessna	6:38
3.	C. M. Nash	Monosport	7:20
4.	Smith Reynolds	Monosport	8:07

15-Mile Race for Open Cockpit Planes, 800 Cubic Inch Class

Place	Pilot	Plane	Time
1.	Sydnor Hall	Travel Air	6:33
2.	Arthur Davis	Waco	6:34
3.	Ed Ballough	Pitcairn	7:24
4.	Fred Schwaemmie	Pitcairn	7:25

15-Mile Race for Cabin Planes, 800 Cubic Inch Class

Place	Pilot	Plane	Time
1.	Jack Bridges	Cessna	6:52
2.	H. A. Little	Monosport	7:17
3.	C. M. Nash	Monosport	7:34
4.	Dale Jackson	Cessna	7:39

Bomb Dropping Contest

Place	Plane Pilot		Distance from Circle
1.	C. M. Nash	Amer. Eagle	7 ft. 7 in.
2.	Roger W. Scott	Fleet	50 ft. 3 in.
2.	H. G. Bissonette	Spartan	60 ft. 2 in.
4.	Wm. Alexander	Stinson	68 ft. 0 in.

Dead Stick Landing Contest

Place	Pilot	Plane	Distance from Mark
1.	George Keightley	Eaglerock	4 ft. 8 in.
2.	Larry D. Ruch	Am. Eagle	37 ft. 6 in.
3.	Wesley Raymond	Bird	53 ft. 0 in.
4.	A. B. McMullen	Challenger	61 ft. 0 in.

15-Mile Race for 300-Horsepower Cabin Planes

Place	Pilot	Plane	Time
1.	Dale Jackson	Cessna	6:10
2.	Jack Bridges	Cessna	6:21
3.	W. L. Snowden	Travel Air	7:08
4.	Wm. Alexander	Stinson	7:13

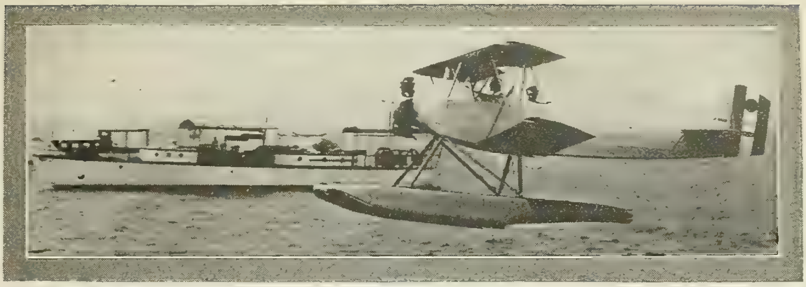
Events of January 15th

15-Mile Race for OX-5 Powered Planes

Place	Pilot	Plane	Time
1.	Richard Stratham	Bird	8:03
2.	Arthur Davis	Waco	8:51
3.	Laurie Yonge	Bird	8:55
4.	W. F. Cummings	Robin	9:04

15-Mile Race for 450 Cubic Inch Class

Place	Pilot	Plane	Time
1.	Errett Williams	Eaglerock Bullet	7:21
2.	C. M. Nash	Monosport	7:37
3.	Dale Jackson	Cessna	7:40
4.	Smith Reynolds	Monosport	8:01



A Fleet training plane equipped with pontoons for seaplane flight instruction

15-Mile Race for Open Cockpit Planes, 800 Cubic Inch Class

Place	Pilot	Plane	Time
1.	Arthur Davis	Waco	6:22
2.	Sydnor Hall	Travel Air	6:29
3.	A. E. Redmond	Travel Air	7:20
4.	Fred Schwaemmie	Pitcairn	7:29

15-Mile Race for Cabin Planes, 800 Cubic Inch Class

Place	Pilot	Plane	Time
1.	Jack Bridges	Cessna	6:35
2.	H. A. Little, Jr.	Monosport	7:25
3.	C. M. Nash	Travel Air	7:39
4.	Dale Jackson	Cessna	7:41

Bomb Dropping Contest

Place	Plane Pilot		Distance from Circle
1.	C. B. Burnwood	Monocoupe	54 ft. 4 in.
2.	Arthur Davis	Waco	71 ft. 8 in.
3.	Frank M. Snyder	Robin	111 ft. 2 in.
4.	Clark Smith	Waco	112 ft. 0 in.

Dead Stick Landing Contest

Place	Pilot	Plane	Distance from Mark
1.	Hugh Woods	Amer. Eagle	9 ft. 6 in.
2.	Arthur Davis	Waco	15 ft. 0 in.
3.	W. L. Stribling	Travel Air	15 ft. 10 in.
4.	Frank M. Snyder	Robin	17 ft. 4 in.

15-Mile Race for 300-Horsepower Planes

Place	Pilot	Plane	Time
1.	Dale Jackson	Cessna	6:09
2.	Jack Bridges	Cessna	6:50
3.	W. L. Snowden	Travel Air	7:06
4.	H. A. Little	Monosport	7:19

NOW THIRTY-THREE APPROVED SCHOOLS

THIRTY-THREE schools throughout the country giving ground and flying instruction were approved by the Department of Commerce up to January 15, according to a report of Department officials. The list of the first twenty-six schools to be so approved appeared in the January issue of Aero Digest. The eight additional approved schools subsequent thereto are as follows:

Penn School of Aviation, Pittsburgh-Butler Airport, Bulter, Pa., transport, limited commercial and private; Art Goebel Aviation Co., Inc., Municipal Airport, Kansas City, Mo., transport and limited commercial; Curtiss Flying Service of Kentucky, Bowman Field, Louisville, Ky., limited commercial and private; Curtiss Flying Service, Transcontinental Airport, Toledo, Ohio, limited commercial and private; Mamer Flying Service, Inc., Felts Field, Spokane, Washington, transport, limited commercial and private; Curtiss-Wright Flying Service, Hartford, Conn., transport, limited commercial and private; and Curtiss-Wright Flying Service, Scarboro, Maine, transport, limited commercial and private.

Tex Rankin Sets Outside Loop Record in Great Lakes Plane

A WORLD'S record of nineteen continuous outside loops was established by Tex Rankin on January 7 in a Great Lakes Trainer plane manufactured by the Great Lakes Aircraft Corporation of Cleveland, Ohio. He broke the previous world's record of thirteen consecutive loops made at the National Air Races at Cleveland last summer. Representatives of the National Aeronautical Association witnessed the test in an official capacity. They gave Mr. Rankin credit for nineteen loops, an additional fifteen loops which were performed being ruled out of the record because the plane did not continue in a straight line from the starting point after the nineteenth loop.

PILOT'S PAY REVISED BY CURTISS-WRIGHT

A NEW schedule of pilots' pay for the personnel of the Curtiss-Wright Flying Service in which base pay has been raised materially and flying pay reduced, has been announced by Maj. E. H. Brainard, vice-president of the Curtiss-Wright Flying Service in charge of operations. The schedule went into effect January 1.

The maximum rates of base pay for pilots of the Curtiss-Wright company, according to the new schedule, are as follows: chief pilot, $3,600 per year; grade A pilots—present graduates of the instructors' school and other experienced pilots—$3,000 per year; and grade B pilots—new pilots—$2,500 per year. In addition to base pay, the chief pilot and grade A pilots will receive flying-time pay of $3 per hour for single-engined planes, and $4 per hour for multi-engined ships. Grade B pilots will receive $2 per hour for flying time and all pilots will receive double pay for night flying.

Pilots on cross-country duty will be paid on a mileage basis as follows: total number of miles to be flown on the trip as computed for the charter tariff, divided by the cruising speed of the ship as shown in the cross country tariffs issued by the traffic

(*Continued on page* 182)

Hand up those SKELLY PRODUCTS

GROUND crews have supreme confidence in Skelly Aviation Products. Many mechanics drive to their work in cars which give better service because they are lubricated and fueled by Skelly. With an established faith in Skelly quality, these motorist-mechanics pour into the ships they service Skelly Aerodynamic Gasoline and Skelly Airplane Oil, sharing the confidence of pilots who have tested these products aloft.

SKELLY AERODYNAMIC GASOLINE

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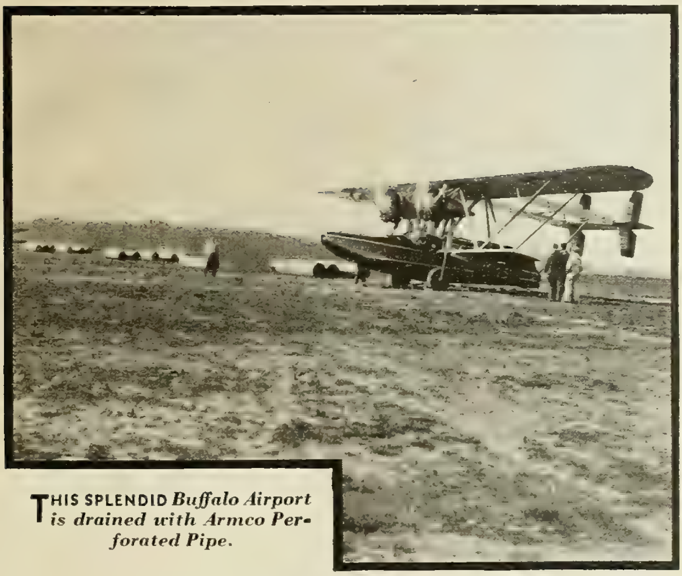
ARMCO DRAINAGE ENGINEERS *have made a* *Great Contribution to Airport Safety*



THIS SPLENDID *Buffalo Airport is drained with Armco Perforated Pipe.*

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Urge Airport Managers to plan better drainage.

AIRPLANE MANUFACTURERS

Make your own "factory" port an example of good drainage.

AIRPORT ARCHITECTS *and* ENGINEERS

Let us send airport drainage literature to those who are interested.

OPERATING COMPANIES

Insist on good year 'round drainage at the airports you use. Soft spots can be prevented.

PLANE OWNERS

Talk good drainage to all airport owners, officials, and managers.

AIRPORT MANAGERS

Our staff of experienced engineers is at your service on all drainage problems.

THE PIONEERING SPIRIT that has been inherent to the name Armco has led the Armco Culvert Manufacturers Association to be first, and unquestionably foremost, in working shoulder to shoulder with the entire aviation industry toward better airport drainage.

This Nation-wide group of drainage specialists has brought to the airport a knowledge based on over two decades of experience in drainage of highways, municipalities, golf courses, parks, etc.

The result of this pioneering has been the complete and unqualified acceptance of Armco Corrugated Pipe as the product best suited to airport drainage.

Armco Record Unequalled

Armco Corrugated Pipe has been tested in Nature's laboratory for 24 years—and now bears Nature's durability "OK" to a degree unequalled by any other corrugated pipe made today. Highway and railway officials throughout the United States and Canada have recognized this superiority.

Airport officials, engineers, architects and contractors, benefiting by Armco's engineering contributions, have also recognized Armco Corrugated Pipe's exceptional record. They have recommended and used Armco Corrugated Pipe in such airports as Buffalo, Rochester, New Orleans, Cleveland, etc.

Just Off the Press!

Another contribution to aviation progress—this booklet, the most comprehensive yet published, "Building Safety into Airports with Efficient Drainage Construction," is now ready for those in a position to further the cause of airport drainage. Sent without obligation or charge.

ARMCO CULVERT MANUFACTURERS ASSN.
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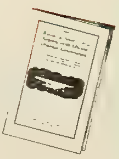


ARMCO

(*Continued from page* 179)

department of the company. The pilot will be paid for the flying time shown on the charter regardless of the actual flying time of the trip.

DETROIT AIRCRAFT FORMS EXPORT GROUP

THE Detroit Aircraft Corporation has announced the formation of the Detroit Aircraft Export Corporation, a subsidiary company which will supervise export sales in South and Central America, China, Japan, Australia and New Zealand. I. J. Miranda has been appointed vice president and general manager of the export corporation.

Mr. Miranda recently completed the organization of resident field representatives in Mexico City, Costa Rica, Venezuela, Japan, Brazil, Argentina, Australia and South Africa. In addition to these resident field men, Mr. Miranda has appointed eighty-two sub-dealers who will be under their supervision. The field manager of Japan will supervise six sub-dealers, and the one in New Zealand three sub-dealers. There is also a sub-dealer in Sydney, Australia; Johannesburg, South Africa, and Mukden, Manchuria.

In addition to Mr. Miranda, the other officers of the Detroit Aircraft Export Corporation will be those of the Detroit Aircraft Corporation.

Simmons Aircraft Division of Steel, Inc., Sends Representative to China

LAWRENCE BEEMER, representative of the Simmons Aircraft Division of Steel, Inc., sailed recently for a year's tour of the Far East, where he will be active in promoting sales of American aircraft. Plans for the inauguration of a network of airlines to connect the principal cities of the interior of China with the coast will be discussed by Mr. Beemer in a conference scheduled at Shanghai. Mr. Beemer will be accompanied on the tour by James H. Bear, and they will be joined at Shanghai by the resident manager of the Simmons interests.

Simmons Aircraft Division of Steel, Inc., which supervises the export of American aircraft, equipment and accessory manufactures, has organized a sales organization in Mexico, Central and South America and the Far East.

Bellanca Planes Ordered for Mexican Airline Service

EIGHT new Bellanca monoplanes have been purchased from the Bellanca Aircraft Corporation of Wilmington, Delaware, by the Cia. Inter-Americana de Transportes Aereos, S. A., for use on its Mexican airlines. The firm recently inaugurated its new mail and passenger route between San Luis Potosi, Laredo, Mexico City and Guatemala. An increase in operating personnel accompanied the enlargement of the organization's activities.

Saving Made by Shipping Uncrated Plane

A METHOD of shipping all-metal transport planes without dismantling and crating was recently demonstrated by the shipment of a Ford trimotor from New York to Spain. The plane was transported on board the *Sovard*, of the Garcia Dias line, for delivery to the Aereas Subvencionadas, Spain. A saving of $3,650 in the cost of transportation was effected, as compared to the cost of shipping a dismantled and crated plane.

The plane was towed to the wharf on its own landing gear and swung aboard the ship by a crane mounted on a lighter. The airplane was then stowed on deck, securely lashed and covered with grease and tarpaulin. The engines, engine controls all remained in place and the wing tips and tail surfaces were removed and stowed in the hold of the ship without crating.

RECENT APPROVED TYPE CERTIFICATES

Airplanes listed below have received Approved Type Certificates subsequent to those listed in the November, 1929, issue of AERO DIGEST, and are supplementary thereto:

Key: p—place; o—open; c—closed; l—landplane; am—amphibion; s—seaplane; conv—convertible; fb—flying boat; b—biplane; m—monoplane.

ATC No.		*Weight Empty*	*Useful Load*	*Gross Weight*
247	Doyle O2, 2polm (LeBlond 65)	792	529	1,321
248	Ireland, N2C, 5pocamb (P&W 450)	3,294	1,566	4,860
249	Mono Monosport 1, 2pclm (Warner 110)	1,056	594	1,650
250	Mono Monosport 2, 2pclm (Kinner 90)	1,053	597	1,650
251	Stearman C3R, 3polb (Wright 225)	7,141	959	2,700
252	Lockheed Vega, 7pclm (Wright 300)	2,305	1,915	4,220
253	Swallow TPW, 2polb (Warner 110)	1,201	538	1,739
254	Travel Air 4D, 3polb (Wright 225)	1,837	1,043	2,880
255	Star "C", 2pclm (LeBlond 65	861	539	1,400
256	Davis D1, 2polm (LeBlond 65).	839	495	1,334
257	Waco, CT225, 3polb (Wright 225)	1,677	923	2,600
	With extra 35-gallon center section tank	1,720	880	2,600
258	Consolidated, Commodore 16, 25pcfbm (2-P&W 575)	9,620	7,980	17,600
259	Inland, Sport, 2polm (LeBlond 65)	768	522	1,290
260	Keystone, K78D, Patrician, 20pclm (3-Wright 525)	10,224	5,776	16,000
261	Curtiss-Robertson "Thrush J," 6pclm (Wright 225)	2,260	1,540	3,800
262	Ryan, B7, 6pclm (P&W 450)	2,503	1,780	4,283
263	Mohawk, M-1-C, 2polm (Kinner 90)	1,142	618	1,760
264	St. Louis, Cardinal C-2-90, 2polm (LeBlond 90)	995	528	1,523
265	Paramount, Cabinaire, 4pclb (Wright 165)	1,620	1,010	2,630
266	Curtiss, Fledgling J-1, 2polb (Wright 165)	2,009	691	2,700
267	Verville, 104, 4pclm (Wright 225)	2,125	1,275	3,400
268	Curtiss-Robertson, Robin W, 3pclm (Warner 110)	1,520	780	2,300
269	Curtiss, Fledgling, J-2 2polb (Wright 225)	2,117	888	3,005
270	Curtiss-Robertson, Robin 4C, 4pclm (Challenger 170)	1,676	924	2,600
271	Bach, 3-CT-9, 10pclm (2-Wright 225 & 1-P&W 450)	5,010	2,990	8,000
272	Davis D-1-K, 2polm (Kinner 90)	925	536	1,461
273	St. Louis, Cardinal C-2, 2pclm (LeBlond 65)	929	521	1,450
274	Rogers RB-X, 4pofbb (Wright 225)	2,396	1,034	3,430
275	Mono, Monocoach 275 4pclm (Wright 225)	1,883	1,217	3,100
276	Parks, P-2A, 3pclb (Wright 165)	1,483	897	2,380

TRADE LITERATURE

Bellanca Pamphlets on Airplane Efficiency

THE Bellanca Aircraft Corporation of Newcastle, Del., recently issued a pamphlet entitled, "Efficiency, the Keynote to Progress," by Leon Kelley, the contents of which were first published in the November, 1929, issue of AERO DIGEST. The booklet discusses the significance of airplane efficiency contests held in this country since 1922. The results obtained by planes of different types entered in the contests are given and analyzed.

The Bellanca corporation has also issued a booklet containing an analysis and review of the 1929 Ford Reliablity Tour considered from the angle of single-engined cabin planes. The information given is compiled from official results of the tour.

Westinghouse Booklet on 1929 Achievements

A BOOKLET entitled "Engineering Achievements of the Westinghouse Electric and Manufacturing Company during 1929" was recently issued in pamphlet form by the Westinghouse company. The volume describes products which the company manufactured during the year and explains their operation in non-technical language. Included in the list of products described is a portable electric plant for use on airplanes and a dynamotor for charging storage batteries designed for airplane use.

First Issue of American Air Law Review Published

NEW YORK University School of Law published in January the first issue of the American Air Law Review, which will be published as a quarterly, according to Professor Alison Reppy of the law school faculty, who will edit the review. The American Air Law Review will be published in conjunction with a legal and legislative research program in aviation which has been established at New York University in coöperation with the Aeronautical Chamber of Commerce.

Goodyear-Zeppelin Book Commemorative of *ZRS-4* Ring-laying

A BOOK commemorating the laying of the master ring of the United States Navy airship *ZRS*-4 at the airship dock of the Goodyear-Zeppelin Corporation, Akron, Ohio, on November 7, has been published by the Goodyear corporation. The book is bound in a deep blue cover, the title "*ZRS*-4 Ring Laying," being stamped in a silver circle on the front cover and containing a raised reproduction of the airship.

The frontispiece is a scene in color of an ocean liner over which float two large dirigibles of the type of the *ZRS*-4. The book reviews the progress of the development of lighter-than-air craft, and discusses the possibilities of their commercial use. The history of the Goodyear-Zeppelin Corporation and its present organization and plans are given, and a discussion is devoted to the construction of the *ZRS*-4 and the airship dock and hangar which the company has constructed at Akron. The text is illustrated with photographs and sketches.

Elementary Laboratory Aerodynamics
By Arthur L. Jordan

"ELEMENTARY LABORATORY AERODYNAMICS" by Arthur L. Jordan is a manual giving directions for laboratory experiments to accompany a course in elementary aeronautics suitable for high school students. Twenty-one separate experiments are described in the manual and instructions given in each experiment include the listing of necessary apparatus and the procedure required to secure the desired result. Supplementary instructions intended for the teacher of a course in which the manual is used include an explanation of the methods to be followed when conducting the course.

The experiments which are described include a study of flat surfaces in an air stream, forces producing lift, low and high aspect ratio, density of air, and propeller strength. The experiments assume a knowledge of algebra and plane geometry on the part of the students.

A Narrative History of Aviation
By John Goldstrom

JOHN GOLDSTROM in "A Narrative History of Aviation" traces the development of aviation from mythology and legends of prehistoric times when man first contemplated flight, through the known history of modern pioneers up to the present time. The volume tells in non-technical language the story of the first flights and fliers as recorded in historical documents. The story of modern aviation is told by recounting a series of outstanding developments to which the author confines his work, considering them as milestones in the history of aviation. The book gives a resume of man's attempts to fly and his actual flights, from the early experimental ones which served to test the application of theories, to the later flights which demonstrated the performance and practicability of aircraft.

Aeronautical Law
By W. Jefferson Davis

W. JEFFERSON DAVIS, counsel for for the United States Government at the International Aviation Congress at Prague, and author of many volumes on aerial communication, has surveyed the laws that have grown up about the aeronautical industry in "Aeronautical Law," recently published. The work lists and interprets aeronautical law in this country up to 1930.

State and Federal regulations of aircraft as common carriers are treated in their application to rates, schedules, taxation and the issuance and sale of securities in Mr. Davis' new work. The many important legal aspects of airports are considered thoroughly; and a full discussion is given to the law of insurance as applied to aviation. The different phases of liability and negligence are covered with examples cited. The upsetting of ancient maxims and the establishment of a definite status of the airman in his relation to the property owner are clearly set forth in the treatment of property rights in the air.

The scope of Federal, State and Municipal control which has puzzled those interested in legislation and regulation is covered with accompanying texts and suggested uniform laws. The texts of all important laws and regulations, and also of proposed laws and ordinances are given fully for reference. State and territorial aviation statutes and regulations are completely indexed to 1930.

STINSON SURVEY OF AIR-MINDEDNESS

RESULTS of a written questionnaire presented to 3,557 members of civic clubs and chambers of commerce for the purpose of obtaining their attitude toward air transportation have been announced by Earl J. Smith, assistant to the president of the Stinson Aircraft Corporation, of Wayne, Mich. Mr. Smith circulated the questionnaire among members attending meetings which he addressed in Illinois, Indiana and Michigan.

Forty-nine per cent of those who answered the questionnaire reported that they had ridden in airplane at least once, and the average number of rides for those who had ridden at all was four. Fifty-one per cent of the men interviewed reported that they had never ridden in an airplane, and gave as the reason that they promised their wives not to ride unless they accompanied them, or that their type of business did not require airplane transportation. A very small percentage admitted that they were afraid to fly. The questionnaire disclosed that the majority of non-riders of airplanes are women and generally of urban population.

Eighty-seven and one-half per cent of those interviewed said that they would pilot their own planes if they owned one. Twelve and one-half per cent said that they would employ the services of a trained and experienced pilot.

Publications devoted exclusively to aeronautics are read by twelve and seven-tenths per cent of the men who answered the questionnaire. According to the statistics obtained, eighty-seven and three-tenths per cent said they obtained their news on aviation from the daily press. Seventy and two-tenths per cent said they would like to own their own plane, and twenty-nine and eight-tenths per cent said they did not care to own a plane, giving as their reason that such an ownership would be too expensive.

Belief that aviation could be advanced in their cities was expressed by ninety-eight per cent, and the ways suggested by the majority were better airport facilities, and more meetings of business men where speakers, qualified to do so, would give them up-to-date information on commercial aviation.

NEW YORK

COURSES in the training of teachers for aviation ground schools are scheduled to begin at New York University on February 3. The course will be given under the general supervision of Roland H. Spaulding and the Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautical Education. Instruction will be concentrated into a period of eight weeks with classes meeting five days a week from Monday to Friday in order to make it possible for flying schools to permit the attendance of their personnel.

Courses included in the curriculum of the ground school for teachers have been arranged in co-operation with the Aeronautics Bureau of the Department of Commerce, and are designed to enable the student to pass the Department of Commerce examinations for the ground school teacher's license. Requirements for admission include a high school education or the equivalent, and automechanic or aeromechanic trade experience, or satisfactory equivalents.

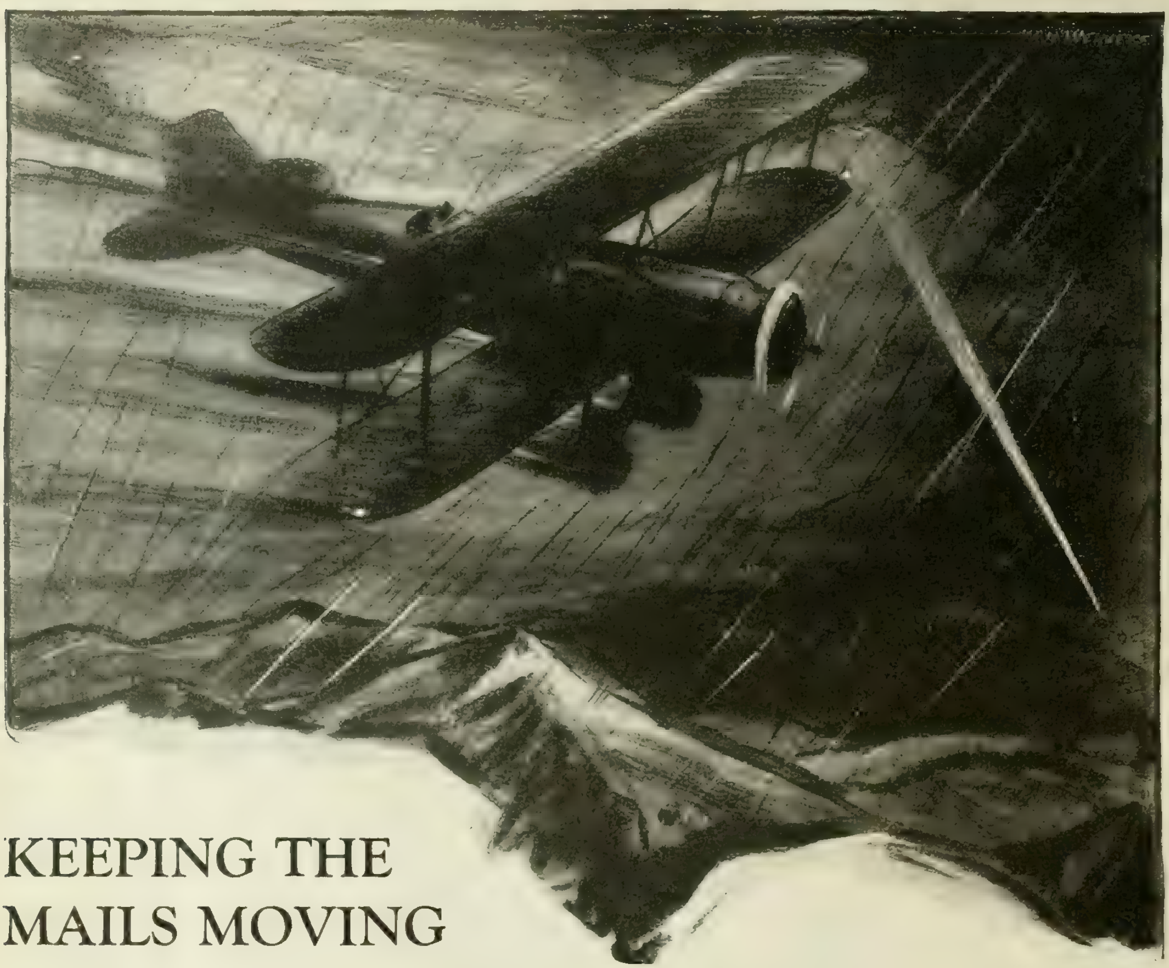
The courses which will be given starting February 3 include the following: airplanes, aircraft instruments, air commerce regulations, administration of ground schools, airplane engines and engine instruments, shop practice in airplane rigging and structure, and in airplane engines. A course in meteorology will be given from February 3 until February 28, inclusive; and a course in air navigation is scheduled from March 3 to March 28, inclusive.

PLANS for the formation of the Curtiss-Wright Exhibition Company to tour the United States demonstrating planes manufactured by Curtiss-Wright subsidiaries were announced recently by Major E. H. Brainard, vice-president in charge of operations for the Curtiss-Wright Flying Service. The organization will assemble a team of pilots who will tour the airports of the country at each of which they will give demonstrations. The planes demonstrated will represent recent types. In addition to the use of modern production planes, the company plans to exhibit earlier types of planes in order to show by contrast the advances which have been made in aeronautical engineering.

The officers of the new company, in addition to Major Brainard as president, will be David Visel, vice-president; H. D. Norris, vice-president and general manager and N. A. Nelson, secretary-treasurer. The directors will be William F. Carey, chairman of the board; Major Brainard; J. A. B. Smith; C. S. "Casey" Jones; Chester W. Cuthell; David Visel; R. W. Schroeder and W. H. Pickens.

AIR ASSOCIATES, INC., recently announced the establishment of a parachute service department in the company's hangar at Roosevelt Field, L. I. The company is distributor for the Russell Para-

(*Continued on page* 186)



KEEPING THE MAILS MOVING

ELIMINATE faulty lubrication and you do away with an important cause of engine failure. On many miles of airways -TP- Aero Motor Lubricating Oil keeps the engines running smoothly—helps to deliver the mails on time.

-TP- Oils are new—the latest development in scientific lubrication. They have been tested and approved by leading manufacturers of airplane engines and by many leading pilots. They are straight-run oils, not blended or compounded, produced from pure, paraffine-base crude by a process for which patents are pending.

This process has marked advantages over other methods. It removes all the paraffine wax, while preserving all the lubricating bodies in the crude. Elimination of the wax is responsible for its low cold test.

In terms of performance this means uniform viscosity at all working temperatures, minimum carbon deposit and ignition trouble from fouled spark plugs, easy cold priming, immediate oil pressure, perfect lubrication winter and summer, on the ground or at high altitudes—a maximum of safe flying hours.

A handsome, practical *Pilot's Log Book* sent free on request.

-TP- Aero
Valve Spring
Lubricant

Also
-TP- Aero
Rocker Arm
Lubricant

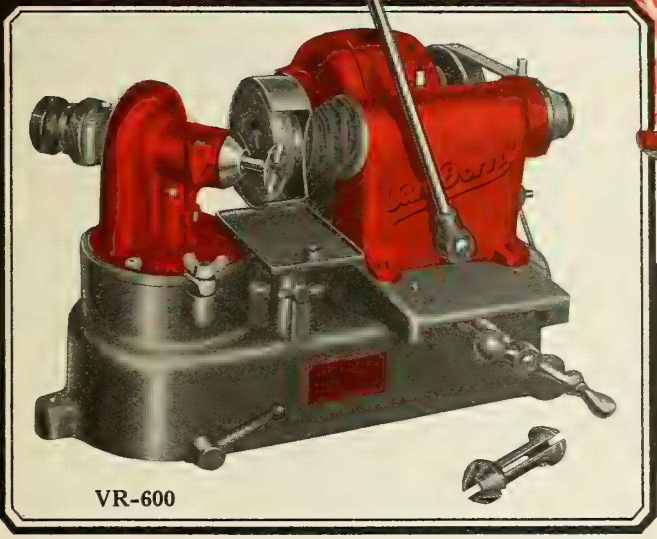
TEXAS PACIFIC COAL AND OIL COMPANY
FORT WORTH, TEXAS
New York St. Louis Los Angeles

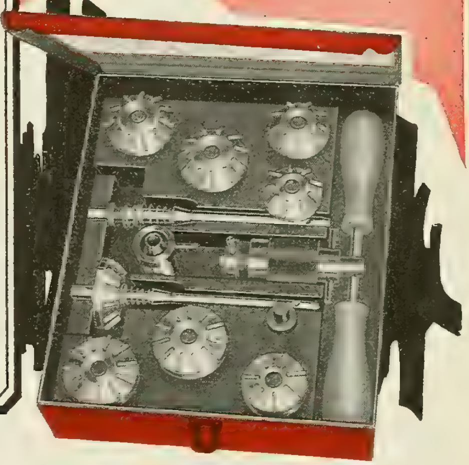
-TP- AERO MOTOR LUBRICATING OIL
REG. U. S. PAT. OFF.

2777

PREVENT VALVE TROUBLE IN THE AIR

Valve failure is frequently the result of misalignment between the seat and guide. Valve reconditioning with the Van Dorn Self-Centering Aircraft Pilots and the Van Dorn Aircraft Valve Refacer produces a precision job, insuring better and safer engine performance.





VAN DORN AIRCRAFT VALVE REFACER

Capacity 1/4″ to 11/16″ valve stem diameters.

A precision grinding machine for refacing valves true to their stems. In addition it will accurately sharpen valve seat cutters, grind rocker arms, etc.

Valves are chucked accurately with twin grip collets which are suitable for aircraft valves with short stems.

VR-600	$157.00

VAN DORN AIRCRAFT VALVE RESEATING SETS

Contain all the necessary equipment for recutting Airplane Engine Valve Seats rapidly and accurately.

UNIVERSAL AIRCRAFT VALVE RESEATING SET
Will service practically all makes of engines.
No. 55 .... $98.00

CURTIS OX-5 VALVE RESEATING SET
No. 56 .... $40.00

WRIGHT VALVE RESEATING SET
for Wright J-5, J-6 and R-1750 Engines
No. 57 .... $68.00

DO THE JOB RIGHT ON THE GROUND

The Van Dorn Electric Tool Company - Cleveland, Ohio

(*Continued from page* 183)

chute Company with which arrangements have been effected whereby a Russell factory representative will be stationed at Roosevelt Field to serve Air Associates' customers. A parachute packing table and a stock of Russell parachutes and accessories have been provided at the hangar.

Dirigible Mooring Mast to be Constructed Atop New York Building

THE Navy Department will coöperate with the Empire State Corporation of New York in the proposed erection of a mooring mast for airships on top of the Empire State Building now under construction in New York City, according to a recent announcement made following a conference between Alfred E. Smith, former Governor of New York State and president of the corporation, Rear Admiral Moffett and Secretary of the Navy Adams.

Construction of the building to be 1,100 feet in height is to be completed by the fall of 1931. Present plans include the erection of a 200-foot mooring mast on top of the building which will be used as a terminal for passenger-carrying dirigibles and will provide landing facilities for airships in New York City. The mooring mast is to be part of the steel construction of the building and will be equipped with an electric winch to draw airships down to anchoring position.

Architects who designed the building have consulted with engineers of the Goodyear-Zeppelin Corporation, which contemplates the establishment of regular dirigible passenger service with the Empire State Building as the New York terminal. The Navy Department will send engineers to confer with the Goodyear company in working out the design of the mast and in discussing the practicability of the plan.

THE Department of Commerce recently issued Approved Type Certificate No. 287 for the Savoia-Marchetti S-65 amphibion manufactured by the American Aeronautical Corporation. The ship is a three-place amphibion powered with a Kinner engine of 90 horsepower.

THE Sunrise Flying Club, Ozone Park, L. I., will sponsor in February the first of a series of twenty-four lectures covering aviation for laymen on the fundamentals of flying. The lectures will be open to those who desire to attend with the intention of eventually becoming members, and will be given at the clubhouse of the organization at Ozone Park. Subjects to be included in the lectures are history of aviation, theory of flight and airfoils, rigging and repair, names and uses of control instruments, simple flying, emergency maneuvers, take-offs and landings, aircraft engines, maintenance and operation, and air traffic regulations. The lectures will cover ground school theory work required of transport pilots.

Lieut. Bert Shields, president of the Sunrise Flying Club and formerly of the Canadian Royal Air Force, recently announced the completion of one year of activities by the club. Five of the members have completed training and received private pilots' licenses, and fifteen have qualified to fly solo. No accidents have occurred during the training of club members. The club plans the purchase of Waco training ships and parachutes during 1930.

THE Navy Department recently contracted for thirty-six Corsair amphibions from the Chance Vought Corporation at a purchase price of $856,812.50. The ships are two-place biplanes equipped with Pratt and Whitney Wasp engines, and will be used aboard battleships and aircraft carriers for observation maneuvers.

J. H. EDWARDS has been elected vice-president of Tri-Motor Safety Airways, Inc., a division of New York Rio and Buenos Aires Lines, Inc. Mr. Edwards was formerly comptroller general of Ecuador and the Dominican Republic.

THOMAS BROOKS has been appointed director of radio activities for the Second Annual New York Aviation Show, which will be held at the Grand Central Palace, New York City, from Feb. 7-15, 1930, it was announced recently by Rex Gilmartin, commander of Aviators' Post No. 743, American Legion, under whose auspices the exposition will be held. Mr. Brooks is radio editor of the New York *Journal* and is also chairman of the new Jersey State Radio Commission.

An elaborate radio program is planned by Mr. Brooks in conjunction with the aviation show.

AN American Savoia-Marchetti amphibion was displayed by the C. T. Stork Corporation of Roosevelt Field, L. I., at the Motor Boat Show held in Grand Central Palace, New York City, in January. The ship exhibited was a three-place open-cockpit flying boat equipped with retractable landing gear, and manufactured by the American Aeronautical Corporation of New York City. C. T. Stork Corporation is distributor in the metropolitan district of American Savoia-Marchetti flying boats and amphibions.

THE Curtiss-Wright Flying Service has relinquished the sales agency of the Ireland amphibion manufactured by the Ireland Aircraft Company, according to a recent announcement. The plane will be distributed in the future by the Ireland company, which will maintain sales headquarters at Garden City, L. I.

CENTRAL NEW YORK

[M. MARVIN]

ONE of the first improvements to be made during 1930 for the further development of the Syracuse Municipal Airport at Amboy will be the installation of the latest and most complete equipment for commercial telegraph sending and receiving at the field. Leon A. Maurer, agent of the Western Union Telegraph Company, is reported to have completed arrangements for the installation of sending and receiving equipment at the Amboy field, and an operator will be in continuous service at the municipal hangar by spring, according to the plans announced.

Boynton to Handle Elgin Sales in New York

HENRY BOYNTON has been appointed Eastern representative of the Aircraft Instrument Division of the Elgin National Watch Co., and will supervise sales in the territory east of Buffalo. The Elgin company is expanding its aircraft division and will soon present a full line of aviation instruments. Mr. Boynton has for several years been in charge of aviation sales for the Moto Meter Gauge Equipment Corp. Headquarters for the Eastern territory will be at 20 West 47th Street, New York City.

BUFFALO

[A. SHEPHERD]

TOTALS for Buffalo's air industry during 1929 will far exceed those of 1928, though in all probability it will fall somewhat short of the predicted figure of $15,000,000, according to a recent announcement of William H. Kessel, manager of the Buffalo Chamber of Commerce Industrial Research Bureau. The manufacturer's valuation of airplanes, airplane engines, parts and accessories for 1928 was placed at $5,000,000. Indications at

Savoia-Marchetti S-56 amphibion recently delivered to New York Police Department.

Mrs. Ruth Miller testing the new Victor sport and training biplane.

present are that the 1929 totals will exceed $10,000,000 and may approach $15,000,000. Among the larger orders delivered by Buffalo manufacturers during the year were four Commodore flying boats, produced by the Consolidated Aircraft Corporation for use by the New York, Rio and Buenos Aires Line, and ten Condor bombers delivered to the U. S. Army Corps by the Curtiss Aeroplane and Motor Company, Inc., from its Buffalo plant.

THE Consolidated Aircraft Company, Inc., recently reported that it has received a contract from the New York-Rio Buenos Aires Line calling for two additional Commodore flying boats, making a total of fourteen of these ships to be delivered to the airline organization, and six of the newly developed Fleetster cabin monoplanes. The Fleetster order is the first received since the announcement of this new all-metal plane, described in the January issue of AERO DIGEST. These planes will consist of three passenger planes, and three for mail and cargo transportation, the latter loading more than 2,000 pounds each. They will be used in high speed express service to all parts of South America.

THE University of Buffalo opened its fourth 15-week course in ground school aeronautics on January 6th. The school has applied for approval by the United States Department of Commerce. The course is open to all over eighteen who are high school graduates or who can submit evidence of equivalent study or practical experience in an allied industry. During the first ten weeks, lectures will be given in Edmund Hayes Hall under the direction of W. Harold Taylor who is giving full time to the teaching of these classes. During the last five weeks lectures and practical instruction will be given two evenings each week in the Colonial Western Airways hangar at the Buffalo Airport.

TITLE to the General Airplane Corporation of Buffalo, N. Y., has passed into the hands of Harry Paltrowitz of New York, who recently purchased the company. J. W. Bishop, general manager of the organization now operating the concern, stated that six of the Aristocrat cabin planes of the General Sky Fleet are being reconditioned in the Buffalo factory and that twenty-one Aristocrats will be placed in the assembly line immediately. A small force is now at work on these airplanes and it is planned to increase the force as soon as normal operation can be resumed.

Completion of the General Airplane Corporation's all-metal mail plane, powered with a geared Pratt and Whitney Hornet engine, and having a payload of 2,400 pounds, is also contemplated, as tests of this plane proved satisfactory. The corporation now leases 40,000 square feet of floor space, and has ample room for expansion.

The president of the new corporation is Fred R. Shore; D. Falk Block is vice-president, and Harry Paltrowitz is secretary-treasurer.

A WOMEN'S division of the Dallas Glider Club of Buffalo, N. Y., was formed recently with eight young women in the organization. Members of the group will receive instruction in glider flying at the Buffalo Municipal Airport from Maj. John Getz, instructor of the men's division of the club. Heraclio Alfaro of Cleveland, Ohio, has started the construction of a glider which will be used to instruct members of the club when it is completed.

Several of the women members of the Dallas Glider Club have already made solo flights in a glider owned by the club. Further instruction of members will await the completion of the glider being built in Cleveland.

COMBINED orders totaling $12,200 have been received by the Consolidated Aircraft Company of Buffalo from the United States Navy and Army Air Corps for spare parts for planes manufactured by the company and used by the air services, according to a recent announcement of the company.

The Consolidated company has received orders for the purchase of two Consolidated Husky training planes and spare parts from the Cuban National Government. The order involved a purchase price of approximately $23,000.

THE Consolidated Aircraft Corporation of Buffalo, N. Y., has established an assembly plant for Commodore flying boats at Langley Field, Va., according to a recent announcement of Consolidated officials. The company recently leased a part of a seaplane hangar at the field from the Government where assembly of the fourth of twelve Commodore flying boats ordered from the company by the New York, Rio and Buenos Aires Line has been started. A staff of eighteen men will be stationed at Langley Field by the Consolidated company and this personnel will be increased as additional Commodore ships are sent there from the Buffalo plant for assembly.

NEW JERSEY

LIEUT. A. H. METTEE has been appointed sales representative of the Switlik Manufacturing Company, Trenton, N. J., manufacturers of the Floyd Smith Safety Chute. Lieut. Mettee will make a tour of the southern states demonstrating parachutes manufactured by the Switlik company.

CARROLL M. AUMENT has been appointed factory manager of the Teterboro and Passaic, N. J., plants of the Fokker Aircraft Corporation. Mr. Aument was formerly production manager of the Fokker corporation.

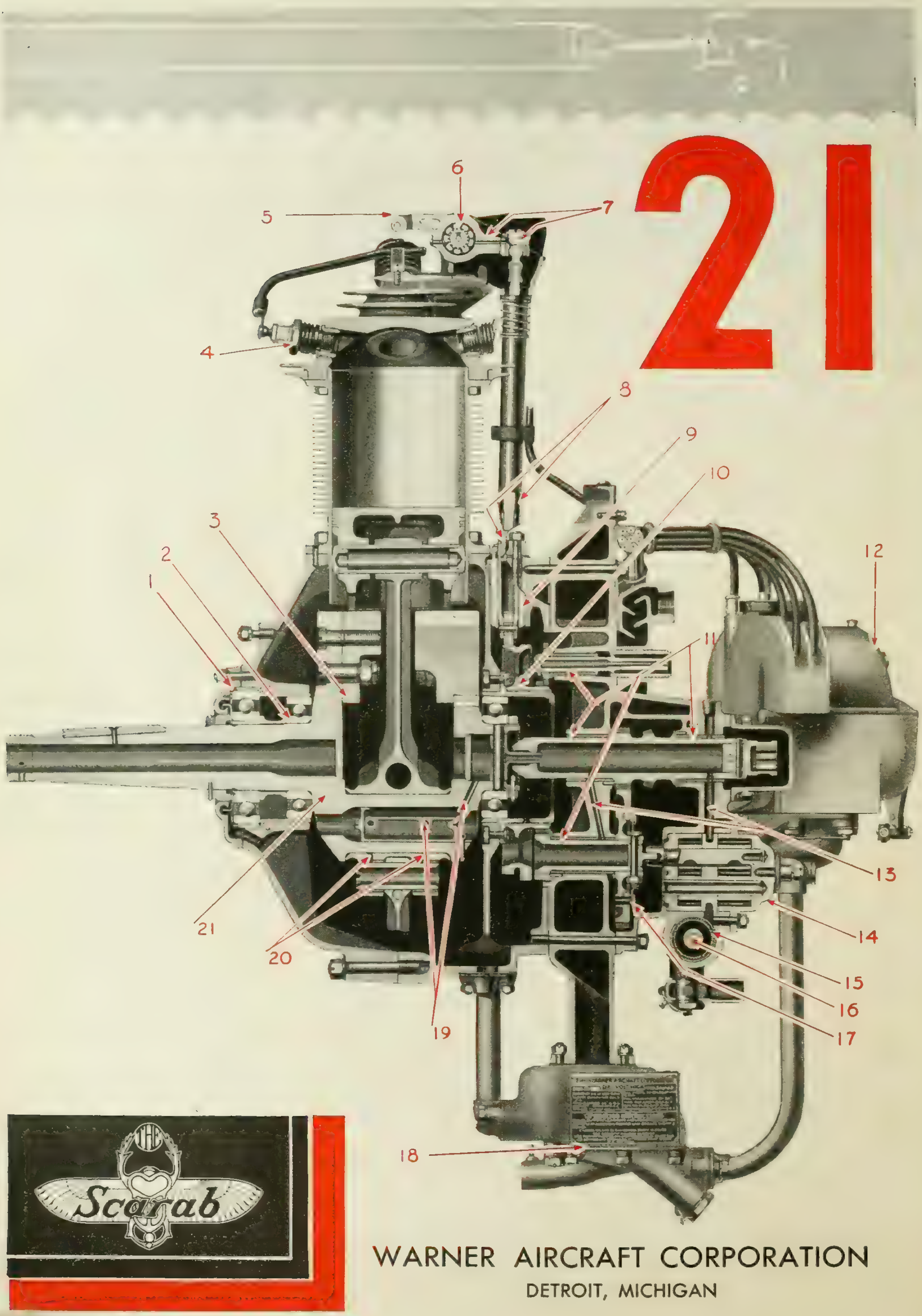
JOHN McHUGH STUART was recently appointed publicity director of the Fokker Aircraft Corporation, according to an announcement of Capt. E. V. Rickenbacker, vice-president of the company. Mr. Stuart was formerly London correspondent of the New York *Herald* and immediately after the war established the regular delivery of newspapers by airplane whereby the Paris edition of the *Herald* appeared on the streets of London simultaneously with its appearance in Paris.

THE Fokker Aircraft Corporation has started the construction of a special 32-passenger Fokker plane which will be used by Harry Husted, Cleveland rubber manufacturer, on a round-the-world flight, scheduled to start next spring. Initial cost of the ship will be $165,000. The scheduled flight will be from San Francisco to San Francisco, and Mr. Husted will compete for the $50,000 prize posted by Col. W. E. Easterwood for the first Pacific flight.

CONNECTICUT

THE Sikorsky Aviation Corporation of Bridgeport, Conn., recently announced the sale of two Sikorsky amphibions of the new S-40 type, which accommodates forty-one passengers, to the Pan American Airways, at a purchase price of $125,000 each. The S-40 amphibion is described in the technical section of this issue.

(*Continued on page* 190)



THE Scarab

WARNER AIRCRAFT CORPORATION
DETROIT, MICHIGAN

POINTS of WARNER SUPERIORITY

1 THRUST BEARING positively clamped between steel surfaces insuring permanent adjustment of crank shaft end play.

2 MAIN BEARINGS are ball bearings tightly clamped against crank cheeks eliminating overhung crank loads. Bearings are supported in crank case by line ground steel sleeves.

3 COUNTER WEIGHTS straddle fitted and cross bolted to crank cheeks in a manner which effectually and safely absorbs torque impulses and centrifugal force.

4 SPARK PLUGS set in bronze inserts and so placed as to cause rapid and complete combustion of the gases and eliminate spark plug fouling.

5 ROCKER ARM ROLLER eliminates side thrust when transmitting motion to valve. Insures long life to valve guides.

6 ROCKER ARM, ball bearing mounted. Bearings sealed to retain lubricant and prevent corrosion.

7 PUSH ROD SOCKET in rear end of rocker arm receives lubrication automatically when lubricating rocker arm bearings.

8 PUSH RODS—enclosed by tube providing complete protection from dust and insuring adequate retention of lubricant at push rod ball ends.

9 CAM FOLLOWER GUIDES—supported throughout entire length by being set in reamed bosses, absolutely preventing destructive side motion.

10 CAM RING. Alloy steel with integral gear rotating slowly at 1/8th engine speed on extra large babbitt lined bearing. Adequately lubricated insuring permanent adjustment for life of engine.

11 REPLACEABLE BRONZE BUSHINGS are provided for every revolving shaft not supported by a ball-bearing. All pressure lubricated. This makes for ease of replacement and prevents any damage to the expensive main castings.

12 MAGNETO DRIVES—Ball Bearing mounted and fitted with shock-absorbing flexible drive, provided with Vernier adjustment, insuring perfect alignment and close synchronization of magnetos.

13 OIL PRESSURE PASSAGES — are all internal, contained within engine parts, eliminating exterior pressure lines.

14 OIL PUMP—Pressure and Suction Pumps tandem-arranged in one unit and carefully fitted to insure maximum capacity. Can be easily removed from exterior of engine as a unit.

15 OIL SCREEN—On discharge side of pressure pump affording protection from dirt and insuring proper oil flow at low oil temperatures.

16 RELIEF VALVE — Simple in design. Accessible for cleaning and impossible to improperly adjust.

17 VALVE TIMING—Obtained by Vernier adjustment and maintained by positive bolt drive.

18 CRANK CASE SCREEN—Located in oil sump prevents possible damage to scavenger pump.

19 MASTER ROD BEARING—Full force lubricated through hollow crankshaft and assisted by centrifugal force, which force also serves to deposit foreign substances in special aluminum trap insuring clean oil at all times to the bearing.

20 KNUCKLE PINS — Full force feed lubricated from master rod bearing.

21 CRANK SHAFT—Generous cross section areas with bearings close to crank cheeks reducing stresses to a minimum and eliminating fatigue.

WARNER "Scarab" ENGINES

(*Continued from page* 187)

Following approval of the new design the order for the first ships of this type was received from the airways operating company. These two ships will be used by Pan American Airways on a 24-hour transport service between New York and Cristobal, Canal Zone, scheduled to be inagurated by the company in December, 1930. The two S-40 type amphibions will be used on the leg of the route between Miami, Florida, and Cristobal, flying the 1,200-mile distance between the two cities across the Caribbean Sea, and making one stop for the purpose of refueling en-route either at Jamaica or the coast of Honduras. Smaller planes will be used on the route between New York and Miami. The S-40 has been designed to withstand heavy seas in the event of a forced landing, according to the Sikorsky company, and will be used on the first Armstrong seadrome route scheduled to be established between New York and Bermuda.

The Sikorsky Aviation Corporation recently delivered a new S-38 type amphibion to the Pan American Airways for operation on the Caribbean route of the company's lines. The company announced the delivery of one S-38 type amphibion to the New York, Rio and Buenos Aires Line, and one type S-38 amphibion to the Army Air Corps. The plane delivered to the Army Air Corps was equipped with a slightly modified wing and a larger stabilizer than that used on the standard type.

NEW VOUGHT FACTORY

THE Chance Vought Corporation, which for more than ten years has built its planes at Long Island City in the metropolitan New York district, is now moving its operations to Hartford, Connecticut, where it will occupy a new plant which has been under construction for several months. This new plant is one of the finest aircraft manufacturing plants in the country. It was designed by Albert Kahn, Inc., of Detroit, in accordance with layouts provided by the Chance Vought Corporation officials. The progressive assembly line method of manufacture will be used in this plant, similar to that used for many years by the Vought company in its Long Island City plant. Every facility which the long experience of Vought officials has indicated as being desirable for efficient aircraft production has been provided.

The new Hartford plant consists of a single story factory building 320 feet long by 620 feet overall, and an administration building 51 by 180 feet, providing about 175,000 square feet of floor space. The factory building exterior is of cream brick and cast stone and the interior has 80-foot clear spans, with a 24-foot ceiling in the final assembly section, and an 18-foot ceiling in the remainder of the plant. The roof truss and window arrangement provide practically even natural lighting throughout the plant.

The employees entrance to the factory building is along one side, where an employment office and modern hospital facilities are provided. Coat rooms for storage of employees street clothes adjoin this entrance, and here also is located the factory superintendent's office.

At the front end of the plant the receiving and stores department is located. A railroad siding and trucking platforms are provided for the receipt of materials. The stock room extends entirely across the front end of the building, with materials so located that they will flow into the respective departments as they are required.

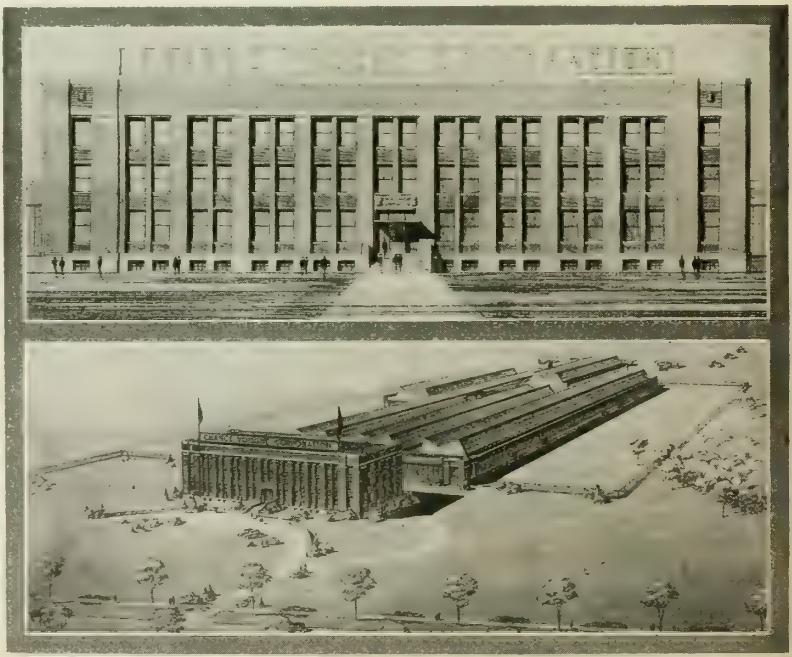
The dope room incorporates all the latest devices for maintaining a high standard of finish for Vought products. Separate paint rooms, sand blast, and other parts finishing equipment are provided at points in the plant which will insure a smooth flow of parts to the assembly department. At the end of the assembly line completed ships may either be wheeled out the door, and, after engine tests in the enclosed section provided for that purpose, either run out on the adjoining field and flown away, or sent to the adjoining shipping department and there boxed to be loaded on cars at the siding and shipped to the destination.

The experimental department also occupies a portion of the main plant. In this section all the most modern equipment is provided for experimental construction and production of new types of planes. A section of the plant is provided for the manufacture of float and amphibion-type gears.

The administration building is a three-story building which is connected to the factory proper by a passageway. The exterior is of cream brick and cast stone, similar to the factory building. The first floor provides facilities for the purchasing, production, sales and Government inspection offices; the second floor houses executive and general offices, and the entire third floor is occupied by the engineering department.

This new plant, scheduled for completion by the first of January, has been somewhat delayed by weather conditions, but materials and equipment are now being transferred to Hartford, the plan being to transfer operations department at a time in order to prevent, as far as possible, any interruption of production. A good many of the 700 men and women employed at Long Island City will be transferred to Hartford, although it will be necessary to take on a good many new employees. The officials of the company feel that no difficulties will be encountered in obtaining help at the new plant, as Hartford is the center of the New England machine tool industry.

The Vought plant is located adjacent to the new plant of Pratt and Whitney Aircraft Company which is already in operation. Both plants adjoin the United Airport, which is to be constructed and which will provide the eastern center of activities for all United Aircraft and Transport Corporation units. The total land occupied by these projects is over 600 acres. A plot of land has also been secured on the Connecticut River only a short distance from the Vought plant. which will provide seaplane facilities—an important consideration, as a large portion of Vought planes are of seaplane and amphibion types built for the United States Navy.



Drawings of the new Chance Vought airplane factory at Hartford, Conn.

RHODE ISLAND

[T. E. BRESNAHAN]

RHODE ISLAND has 26 licensed airplane pilots and 23 licensed aircraft. Although it is the smallest state in the Union, only two other New England states can boast a greater number. Massachusetts is first in New England with 211 pilots and 137 aircraft and Connecticut next with 73 licensed pilots and 72 licensed airplanes. Rhode Island has 12 licensed mechanics, and, in addition to the 23 licensed planes, there are nine others to which identification numbers have been assigned.

NICHOLAS BERTOZZI, president of What Cheer Airways, Inc., operators of the What Cheer Airport in Pawtucket, has secured the permanent closing of Beverage Hill Avenue, which ran through a portion of the landing field. The Pawtucket board of aldermen has agreed to abandon that portion of the thoroughfare.

A NEW airway bulletin for the Westerly, R. I., airport has been prepared by the Aeronautics Branch of the Department of Commerce and is now available for distribution. The bulletin includes sketches of the field, showing the location of field equipment, dangerous obstacles, and the dimensions and nature of the planding area.

THE Woonsocket, R. I., airport, now under construction, is scheduled to be opened about the middle of June. Lockwood, Greene Engineers, Inc., of Boston have been retained in charge of the developments.

MASSACHUSETTS

[W. S. ROGERS]

BOSTON AIRPORT recently celebrated the opening of its Memorial Portico, the administration building. Besides acting as public terminal for the airport where restaurant service, information headquarters and waiting rooms will be available, the Federal, state and local aviation officials will have offices in the structure. The weather bureau is to have one office at the field, and Captain Albert L. Edson, supervisor of the Boston Airport, will make his headquarters in the observation tower.

Patrolman Dan Eldridge has been given the job at the field of receiving visiting pilots, registering them, giving information as to plane service, and assigning definite hangars when no choice is made by the pilot. Large signs will soon appear to aid visitors in finding the airport supervisor to register.

DANIEL ROCHFORD, formerly aviation editor of the Boston *Transcript*, is now with Pan American Airways as advertising manager in charge of public relations. Franklin Jordan is now aviation editor, succeeding Mr. Rochford.

Rev. George H. Woodley, pilot and missionary

A FLEET training plane was recently purchased from the Colonial Flying Service by Father George H. Woodley, a Jesuit missionary stationed at Anchorage, Alaska. Father Woodley has started flying instruction at the Boston Municipal Airport and plans to return to Alaska next spring where he will use two Fairchild cabin planes to travel over his four parishes in his regular duties and in carrying supplies and medicine in times of emergency.

DEVELOPMENT work was started recently on a private airport near Twin Mountain, N. H., on U. S. Highway Route No. 3 to be known as the Twin Mountain Airport. The work on the field is scheduled to be completed about June 1, according to an announcement of John L. Houghton, who is active in the promotion of the airport.

FORMAL dedication of a new hangar and shop constructed at a cost of $100,000 at the Boston Municipal Airport by the East Coast Aircraft Corporation was held on January 11. The company is distributor for the Travel Air Company and the Keystone-Loening Aircraft Corporation, and operates a parts and service depot for the Curtiss-Wright Corporation.

The repair and service shop was equipped at a cost of $50,000, according to the company, and spare parts with a total value estimated at $15,000 are carried in stock. Ten men are employed in the shop, which can turn out three airplane engine overhauls every two weeks. Equipment includes a test bed which is similar to the one constructed at the factory of the Curtiss-Wright Corporation.

East Coast Aircraft Corporation sold $130,000 worth of Travel Air planes during 1929 in New England, according to Frank Le Man, sales manager of the company. Sales included five Travel Air cabin planes. Frederick L. Ames, president of the East Coast Aircraft Corporation, formed the company with his own capital, taking over the franchise for the Travel Air Company when the Boston Aircraft Corporation, which previously held the sales rights in that territory, was acquired by the Curtiss-Wright Corporation.

PENNSYLVANIA

THE Wyoming Valley Airport at Wilkes Barre, Pa., will add fifty acres to its present area if efforts to obtain the land meet with success. A seaplane base to be constructed on the Susquehanna River which borders the field on the east side is included in the plans of the officials of the field. Dredging of the river for this purpose will commence as soon as the weather permits, and the operating company hopes to have the job completed early in the summer.

Charles D. Griffith, former assistant manager of Roosevelt Field, L. I., has succeeded C. E. Herrick, who has been manager of the Wyoming field since its opening last June. The six months ending the year 1929 have been very busy ones at the airport.

The flying equipment of the field at present includes two Fleet training planes, an Avro-Avian and two Warner-powered Travel Airs. These planes have flown over 1,200 hours, or approximately 122,000 miles, since the opening of the field. The shops, which are under the direction of J. Wellard, chief mechanic, are equipped to handle all kinds of repair work.

All local and sight-seeing flights from the field are handled by Phil Reynolds and Eggart Briem. There are four privately owned planes at the field. The Frank Martz Flying Service operating from Wilkes Barre has discontinued its semi-weekly passenger service to New York City until spring. The company plans to open passenger lines to Philadelphia, Atlantic City and Buffalo during the summer. A Bellanca Pacemaker has been used by the company and they plan to purchase more ships of this type to use on the new routes.

MARTIN JENSEN is building a training plane of his own design in his shops at the Martin Jensen Airport at Lehighton, Pa. The plane incorporates several new and unusual features in landing gear, tailskid and visibility. It will be powered by a Kinner engine.

The fair grounds which adjoin the Martin Jensen Airport have been unused for some time and it is probable that this land will be added to the airport. If efforts to annex the grounds are successful, Lehighton will have one of the largest flying fields in the East.

General Airmotors' Engine Approved

THE Moore five-cylinder radial airplane engine to be manufactured in Scranton, Pa., by General Airmotors, Inc., recently received approval from the Department of Commerce. It is rated 120 horsepower at 1,600 revolutions per minute. The engine is radical in design, hav-

(Continued on page 194)

WITH cities no less modern than our own but even more remote from each other than the early American colonies, the nations of Latin America are suffering from retarded progress because of natural barriers with which their available transportation agencies cannot cope. True, there are a few railroads, but their mileage is so small that they might almost be discounted as a means of transportation. ❡ Industrial and social progress, as well as international exchange, travel only as fast and as far as the mule or steamboat allows. Yet, even if these primitive vehicles could be miraculously gifted with speed, they still would be inadequate, for they cannot pass through the heavily wooded regions nor scale the lofty mountains . . . . they must wend their way tediously *around* them. Lindbergh, Doolittle, the Army Pan-American fliers and others have blazed the trail UP AND OVER. The people of these southern countries are convinced now that the airplane is the vehicle for which they have been searching. ❡ The aircraft industry of the United States has a fertile and ready market waiting, not too distant for profitable export, whose growth should be even more rapid than that of the domestic market. Consider the Mexican, Cuban, South and Central American countries when you estimate production and sales for 1930. ❡ AERO DIGEST has taken the lead in providing the aviation industry with an advertising medium circulating in these nations. Write for advertising rates, circulation and other data on the monthly Pan-American Edition which goes to this new, fertile market.

Bohnalite is the favorite light alloy of the aircraft industry because it conforms most admirably to aeronautical requirements.

Technical control and special heat treatments, applied to this series of light alloys, have developed physical properties of the utmost importance to safe aircraft construction.

What are your casting problems? Undoubtedly Bohnalite engineers can be of assistance.

Aircraft Division

BOHN ALUMINUM & BRASS CORP., DETROIT, MICH.
New York Chicago Philadelphia Cleveland Pittsburgh

62% LIGHTER **BOHNALITE** THAN IRON

(*Pennsylvania News continued*)

ing two intake and one exhaust valves to each cylinder.

Robert Moore, who was co-designer of the war-time LeRhone power plant, has patented the valve mechanism. He also holds a patent on a new clamping device for holding the cylinder heads in place. With this device the compression ratio can be varied. Following Government tests in Washington, the Navy Department ordered three of the new motors for test purposes.

The first of the engines built has had nearly 400 hours without an overhaul. It has been placed in a Fairchild K. R. 34 for flight tests. "Heinie" Wintersteen is test pilot for the concern.

THE Lycoming Manufacturing Company of Williamsport, Pa., has received an order for 500 airplane engines from the Stinson Aircraft Corporation of Wayne, Mich., according to a recent announcement of Lycoming officials. The engines will be nine-cylinder, radial types of 210 horsepower each. The contract calls for delivery of the entire order by May 1.

The engine has been developed by the Lycoming company as the result of two years experimentation and research, according to the company. It was given an Approved Type Certificate by the Department of Commerce last fall. The company recently completed the construction of an addition to its factory which will be devoted to the manufacture of aircraft engines.

PITTSBURGH

THE Hamilton Standard Propeller Corporation, a division of the United Aircraft and Transport Corporation, has acquired the American rights for the manufacture and sale of the Leitner-Watts all-metal adjustable blade propeller, and the engineering department of the organization has started work on the development of a variable pitch type propeller, according to a recent announcement of the firm's officers. The company will establish distributing agencies throughout the United States during 1930, according to the report, and will select dealers who have an organization and equipment suitable for servicing metal propellers.

Comdr. E. E. Wilson, formerly of the Naval Air Service and the Bureau of Aeronautics, has been appointed vice-president and general manager of the company, and main offices have been established at Pittsburgh, Pa. The plant located at Pittsburgh has been moved into a three-story building of modern construction where machinery for the manufacture of metal propellers has been installed. The plant comprises approximately 75,000 square feet and will be operated in conjunction with the factories established at Los Angeles, California, and Milwaukee, Wis.

THE Second Annual Pittsburgh Aircraft Show is scheduled to be held at Motor Square Garden, Pittsburgh, Pa., March 6-15 inclusive. Show headquarters have been opened at the William Penn Hotel and organization of the exhibition has been started under the supervision of Ray Krimm, director. Mr. Krimm managed the Pittsburgh show in 1929 and the Baltimore Aircraft Show which was held December 9-14.

The main floor and the basement of Motor Square Garden will be used for the Pittsburgh exhibition, and approximately 200 booths will be provided. Seventeen planes have been entered in the show, according to a recent report. Exhibits will include sailplanes and gliders in addition to airplanes, and a large exhibit will be arranged to depict the advances made in motorless aircraft design during the past twelve months. Included in the educational and entertaining features of the show will be the showing of motion pictures depicting the early history and progress of aviation in this country and abroad, a pictorial history of the Army Air Service and motion pictures of glider flights.

The Pittsburgh Aircraft Show is sponsored by the Aero Club of Pittsburgh. Capt. William J. Austin has been appointed general chairman of the show committee, and Capt. E. C. Speer is show sales manager.

PHILADELPHIA

[R. GARD]

WITH the signing of a lease for ground recently at Central Airport, Camden, N. J., officials of the Aircraft Engine Corporation announced that the Jacobs aircraft engine will soon be put into production at the Camden Field. The factory building to be erected on the field will be seventy-five feet by one hundred and fifty feet, and will cost approximately $30,000. Plans call for a clear space inside the building for its full length and width. The specifications also include four test stands for engines to be located outside the building.

All factory equipment is ready to be installed as soon as construction will permit. Material for 100 engines has already been received at the Philadelphia shops of the concern, and orders have been taken for twenty-four engines.

The engine, designed by Albert R. Jacobs, president of the corporation, is of radial, air-cooled design having seven cylinders and developing 140 horsepower.

Officers of the organization other than Mr. Jacobs as president are Henry McFadgen and Robert Glendenning, acting vice-presidents; J. Story Smith, secretary-treasurer, and R. Sanford Saltus, J. Brooks, B. Parker, W. Lawrence Saunders, Charles I. Thompson, Hamilton Carpenter, Geoffrey S. Smith, and J. Andrews Harris, 3rd, directors.

THE first flight of an airplane of the Marine Corps northward from Nicaragua to the United States was recently completed at Philadelphia, Pa., according to an announcement of the War Department. The plane was one of five planes, manufactured by the Fokker Aircraft Corporation, which were flown from Quantico, Va., to Nicaragua for the use of the Second Brigade of Marines stationed there.

The plane on the return flight to the United States was piloted by Lieut. John N. Hart and Staff Sergeant Laurens, co-pilot, of the Marine Corps. The route of the flight was as follows: Managua, Belize, Vera Cruz, Tampico, Brownsville, Houston, Montgomery, Fayetteville, Washington, D. C., and Philadelphia.

FRANK ROGERS, of Gloucester, N. J., has taken over the distributorship for New Standard Trainer planes for the Philadelphia area, which covers eastern Pennsylvania, southern New Jersey, and the state of Delaware.

Ludington Firm to Distribute Curtiss-Wright Products in Philadelphia Area

THE Ludington Philadelphia Flying Service, Inc., has been appointed distributor in the Philadelphia, Pa., territory for the Curtiss-Wright Sales Corporation, which controls the sales of all the subsidiary companies of the Curtiss-Wright Corporation. The Ludington company operates the Philadelphia Airport where aircraft and aircraft accessory sales and a Wright service station will be maintained. Aircraft accessory sales and short passenger flights will also be operated by the company at Central Airport, Camden, N. J. The company recently completed negotiations for the establishment of sales and display rooms near the business center of Philadelphia where aircraft will be exhibited and tickets for long or short flights on company planes may be purchased.

The company will maintain minor repair and service stations at both fields, where hangar rentals for private and commercial aircraft will be provided. Major overhauling and rebuilding of planes and experimental construction will be conducted in the company's shop at the Philadelphia airport. The company will continue in the summer of 1930 the operation of Cape Cod Airways which last summer operated planes on a week-end service from Central Airport to Long Island, Watch Hill, Narragansett, Newport and Wood's Hole.

The officers of the Ludington Philadelphia Flying Service, Inc., are as follows: C. T. Ludington, president and treasurer; R. S. Saltus, Jr., vice-president; W. W. Kellett, secretary; R. P. Hewitt, general manager; J. C. Newlin, Jr., assistant general manager at the Philadelphia Airport, and E. W. Day, Jr., operations manager at Central Airport.

MARYLAND

[E. W. WALSH]

BALTIMORE'S first airplane engine factory was organized when the Chevrolet Aircraft Corporation moved to Baltimore, Md., from Indianapolis, Ind., on January 15. The Chevrolet company is headed by Louis Chevrolet, designer of the Chevrolet automobile and the Fron-

(*Continued on next page*)

an announcement by

AMERICAN EAGLE

The flying public looks to American Eagle for progress. American Eagle is regarded in the aeronautical industry as an outstanding example in keeping a step ahead of the parade.

American Eagle aircraft, noteworthy criteria of stability, airworthiness, flyability and ruggedness, day after day, month after month and year after year, have set the pace.

To keep this faith always has been American Eagle's ambition. It always has been the goal of E. E. Porterfield, Jr., American Eagle's president. Each new American Eagle must be better than its predecessor; continually there must be new American Eagles—planes to fill every need of the flying public.

For 1930 American Eagle again strides forward with "something new". Every whim of engineer, production manager, pilot and salesman has been built into the new American Eagles.

Come to St. Louis February 15 to 23, inclusive and let us show you these new American Eagles. They'll be the highlights of the

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American Eagle presents the most complete line of aircraft—more models and more Approved Type Certificates, than any other independent factory in America! Dealers here is a real opportunity!

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AIRCRAFT CORPORATION

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"MASTER OF THE SKIES"

(*Maryland News continued*)

tenac racing car.

Designs for the light four-cylinder engine weighing 283 pounds were developed in the Chevrolet Aircraft Corporation's factory at Indianapolis. The new power plant has been tested by a 700-hour continuous run on the blocks. Ten engines had been built at the Indianapolis plant when it was decided to move the plant to a site on Middle River, Baltimore.

PASSENGER rates on the airline operating between Baltimore, Philadelphia and New York have been materially reduced, according to officials of the Baltimore Airways, Inc., operators of the line. The single rate fare between Baltimore and New York has been reduced $7, making the fare $18 instead of the $25 single fare which has obtained since the opening of the service on October 28. The round-trip rate between Baltimore and New York has been reduced $10, making the fare $30 instead of $40.

BALTIMORE is going to have a radio beacon system that will guide planes between Baltimore, New York and other cities as far south as Atlanta, Ga., according to a recent report of Pitcairn Airlines officials. Installation of the system is expected to be completed within the next few weeks. It will make possible the dissemination of weather data collected by weather instruments which are to be installed at the Baltimore offices of the Pitcairn Aviation, Inc., operators of the air mail line to Baltimore. These will aid in predicting local weather conditions. A radio receiving set will also be installed.

THE Baltimore, Md., offices of Pitcairn Aviation, Inc., will be moved in the near future to the new building being erected by the city of Baltimore at Logan Field. The building also will house the field custodian's offices and dressing rooms. Beverly C. Jones is local manager for the air mail operating company.

THE Black and Decker Manufacturing Company of Towson, Maryland, recently purchased a six-place cabin Travel Air monoplane powered with a nine-cylinder 300-horsepower engine, according to S. Duncan Black, president of the company. The plane will be used on a country-wide tour of airports for the purpose of demonstrating products of the Black and Decker firm to aircraft and engine manufacturers. The company manufactures portable electric tools.

WASHINGTON, D. C.

[WING OVER]

THE Bureau of Standards has furthered experiments to give instantaneous positions in three dimensions to airplane pilots so that they may land successfully in fog. This work has been in progress for about a year and numerous methods and devices are being tried.

The pilot landing in fog must be guided to and along a suitable runway, must know how far along it he has gone, and the height of the landing path above ground must be properly regulated. Of these three requirements, the first is given by a small directive radio beacon, the second by a marker beacon, and the third by a landing beam, in the experiments of the Bureau.

The first of these, the small directive beacon, has been installed by the bureau both at its own field, College Park, Md., and at Mitchel Field, L. I., for the Guggenheim Fund. At Mitchel Field successful blind landings were made by Lieut. James H. Doolittle in September, using this beacon in conjunction with several non-radio instruments.

At College Park all three elements of the system have been installed, the small directive beacon, marker beacons, and the landing beam. The first two are identical in principle with the same devices developed for use on the airways for guiding airplanes from one airport to another.

The new method now being tried to provide the third element of the system—to regulate properly the height of the landing path as the airplane approaches the landing—is a directed beam. This beam, of 60,000 to 100,000 kilocycles, is directed at a small angle above the horizontal.

A simple receiving arrangement with visual indicator is used on the airplane. When the airplane is so maneuvered as to keep the deflection of this indicator always at a fixed point, the airplane follows a gliding path down to the ground suitable for the landing operation. In one experiment the landing path marked out by the beam began at approximately three miles from the transmitter. The shape of the radio path can be judged from the following measurements of the directive impulses:

Distance from transmitter	Height in feet
3 miles	2,000 feet
2 miles	500 feet
1 mile	240 feet
½ mile	85 feet
1,000 feet	15 feet
750 feet	10 feet
500 feet	5 feet

The slope of this path decreases as the pilot approaches the ground, tending to facilitate a proper landing. Each of the three elements of the landing system is being perfected by detailed study and trial flights.

TWO changes have been made in the air regulations of the Department of Commerce, according to a recent announcement of Major Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Hereafter limited commercial pilots shall have all of the privileges conferred and will be subject to all of the restrictions imposed upon transport pilots, except that they shall not instruct students in the operation of aircraft in flight for hire and they shall not pilot aircraft carrying persons for hire outside of the areas mentioned in their licenses. They may, however, be permitted to function as co-pilot on dual-controlled aircraft when accompanied by a transport pilot who is in command of and responsible for the operation of such aircraft. They may receive credit for twenty-five per cent of the time during which they are the sole manipulators of the controls, according to the new regulations. The transport pilot in command of and responsible for the operation of the aircraft during such flight, may credit as solo time all of the time not credited to the co-pilot.

The amended regulations state that a person is engaged in solo flying when he is the sole operator of the controls and is in command of aircraft in flight. A co-pilot who is a licensed transport pilot may credit the time during which he is actually the sole manipulator of the controls, although he may not be in command of the aircraft.

PLANS for the immediate development of facilities for commercial aeronautics in Washington, D. C., have been announced by officials of the Federal Aviation Corporation of New York. Col. M. C. Cooper, vice president of the company has announced that $100,000 will be spent this winter for improvement of the Washington airport which is already in operation at the south end of the bridge which connects Washington with the Virginia shore of the Potomac River. An additional half million dollars has been appropriated for further development of the property.

It is the plan of this company to make the Washington Airport a link in a chain of landing fields surrounding the capitol. The enterprise is wholly a privately financed one, operating with funds furnished by persons who are interested in aviation at the capitol.

The Washington Airport contains nearly 100 acres of level ground, most of which is now available for use. Three runways ranging in length from 2,200 to 2,600 feet are being completed and efforts are being made to finish them in such a manner as not to interfere with flying on any part of the field.

Contracts are being let for construction of the first of a group of modern hangars, according to officials of the company. Plans have been completed for a passenger station and administration building which will also be modern in every respect.

It is the intent of the company to make the Washington Airport primarily an air terminal. Accordingly the organization has also bought a 1,300-acre tract in Hybla Valley, near Alexandria, Va., eight miles from the airport. Development of this airport has started, the plans calling for the location on the larger field of student flying, plane storage, shop-work and servicing. Air taxi service will be maintained between the two ports.

LIEUT. WALTER HINTON, president of the Aviation Institute of the U. S., recently addressed the students of Colgate

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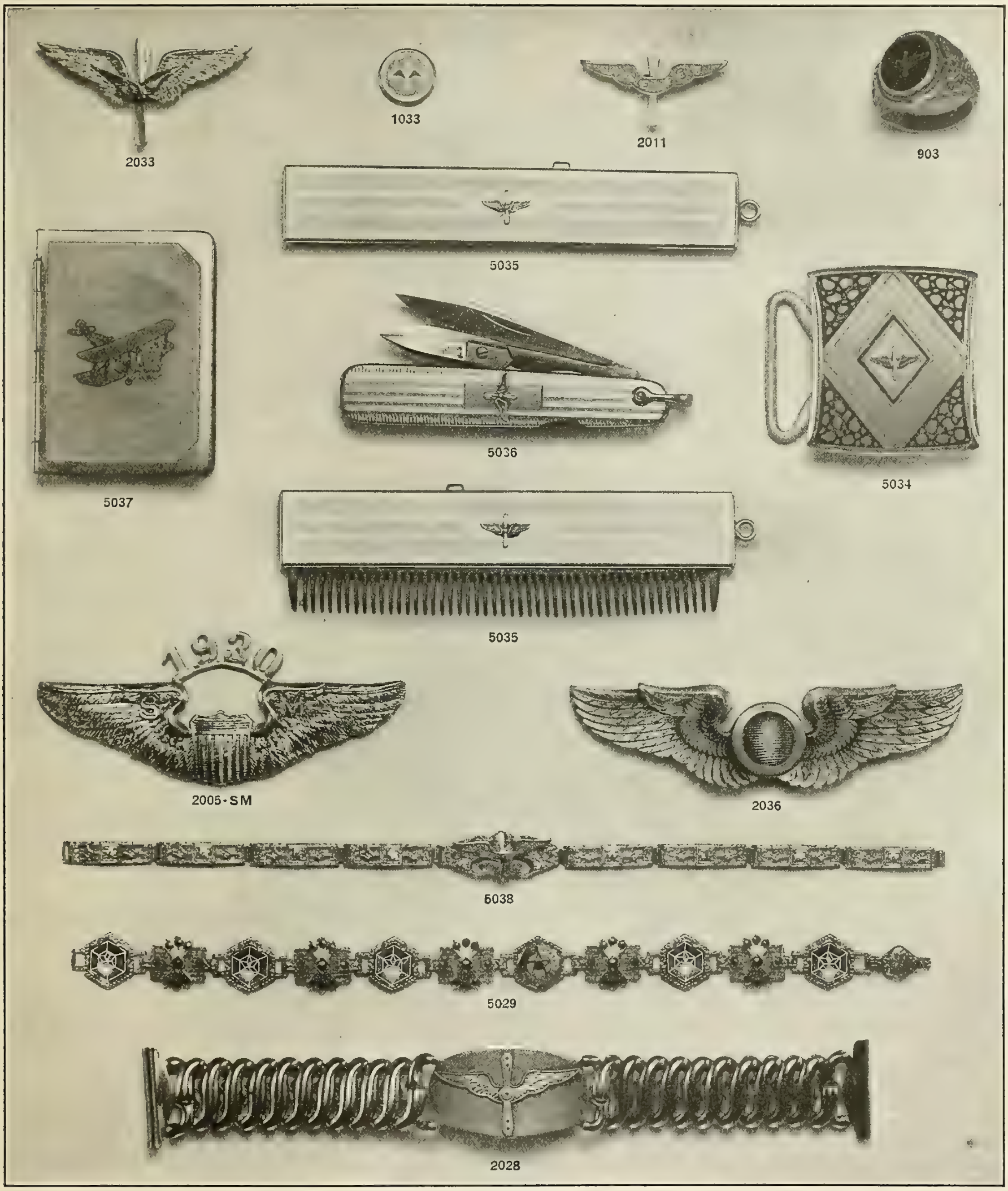

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Metal Military Ornaments for the United States Army, Shooting Medals, Athletic Medals, Regimental Insignia, R. O. T. C. Metal Ornaments, Novelties mounted with Aviation and Military Insignia, Special Order Work

(*Washington, D. C., News continued*)

University at Hamilton, New York, on the subject "Opportunities in Aviation." Lieut. Hinton is chairman of the National Exchange Clubs of America which have adopted an Aviation promotion program advocating adequate airport construction and proper air marking of cities and highways.

THERE are 775 medical examiners located throughout the United States officially appointed to examine pilots and student pilots as to their physical and mental fitness for flying, according to a recent announcement of the Aeronautics Branch of the Department of Commerce. The examinations are made before the pilot is licensed to determine his mental and physical condition; after he has been licensed a check is made periodically.

The number of physical examinations conducted by these medical examiners increased from 11,688 during 1927-28 to 28,153 during 1928-29. The medical fee for the original examination of pilots applying for transport, limited commercial and industrial pilot's licenses has been fixed at $15 by the Department of Commerce. The fee has been fixed at $10 by the department for original examinations of private and student pilots; and at $5 for the mid-year checks of transport and limited commercial pilots. These fees are payable to the medical examiners who conduct the examinations.

THE Department of War announced on January 4 that the Army Air Corps will make an aerial photographic survey of prehistoric irrigation canals located near Phoenix, Arizona. The survey will be made at the request of the Smithsonian Institution, which is interested from an archeological standpoint in these canals which are becoming obliterated by present-day irrigation projects.

The survey will be made from the air over territories of the Gila and Salt Rivers. A pilot of the Army Air Corps, a photographer from the enlisted ranks and an airplane have been ordered from Crissy Field, San Francisco, Calif., for the purpose of making the survey.

LIEUT. CARL B. HARPER of the Bureau of Aeronautics, who has been engaged in conducting tests for a number of months with the Handley-Page slotted wing and American adaptations of the slots, has been assigned to duty aboard the airplane carrier *Lexington*. Lieut. Harper is the author of a number of technical papers on the use of wing slots to break up spins and stalls.

OHIO

A TOTAL of 1,120 hours and 46 minutes of flying time in lighter-than-air craft was completed during 1929 by V. L. Smith, a member of the airship personnel of the Goodyear-Zeppelin Corporation of Akron, Ohio, according to a statement issued by the Goodyear company. During 1929, Mr. Smith averaged 93 hours per month in lighter-than-air craft, covered 51,678 miles, made 1,178 take-offs and landings without an accident, and accompanied 2,044 persons in their first flights in airships.

THE schedule of activities in 1930 of the Goodyear-Zeppelin Corporation of Akron, Ohio, will include the completion of the metallic hull structure of the *ZRS-4*, one of the two dirigibles which the company is to construct for the U. S. Navy in the company's airship dock at the Akron Municipal Airport, according to a recent announcement of Goodyear officials. Several power plants will be installed in the dirigible within the next twelve months. The company will also begin the manufacture of the gas cells for the airship, and the manufacture of parts for the *ZRS-5*, the second ship which the company will construct for the Navy, will be started during 1930.

THE Huffman Manufacturing Company of Dayton, Ohio, manufacturer of repair shop and service station equipment, recently announced the appointment of the following distributors: Wallace R. Lynn, San Francisco, Calif.; Jack L. Hursch Co., Denver, Colo.; Stanford Bros., Chattanooga, Tenn.; and Harry L. Malsby, Atlanta, Ga.

COLUMBUS

[W. D. WALTER]

ORDERS have been received at the Air Office, Fifth Corps Area, promoting William F. Centner, superintendent of Port Columbus, from the grade of Captain to that of Major, Air Corps Reserve. Other Reserve officers flying regularly at Norton Field who have been promoted are Captains D. H. Young and A. H. Tabor, to Major, and Lieutenants Harold Sites and Grant Melvin to Captains. There is also a number of new First Lieutenants.

THE following officers of the Army Air Corps Reserve are at this writing serving active duty tours at Norton Field: Lieutenants Randall M. Mitchell, Richard Morehouse, Walter K. Patterson, and Harold H. Hunter.

EDGAR T. WOLFE, publisher of the *Ohio State Journal*, has turned his Stinson-Detroiter plane over to Port Columbus for the official use of Major Centner, superintendent. The ship is a six-place cabin monoplane, powered with a Wright Whirlwind. While Mr. Wolfe will not relinquish ownership of the plane, it will be at all times available for Major Centner's use, and has been lettered with the slogan "Port Columbus—America's Greatest Air Harbor."

THE Columbus T.A.T. office has received tentative orders transferring Robert D. Shields of the traffic department to Waynoka, Oklahoma, as passenger agent. Mr. Shields has been with T.A.T. at Port Columbus since the opening of the office here.

THE new St. Louis-New York air mail route through Indianapolis and Columbus has been approved by the Post Office Department, and, although bids have not yet been opened, daylight service over the route is expected to be inaugurated in the near future. Regular night service will not begin until the completion of the installation of beacons and other night-flying equipment; this work is now in progress from Columbus eastward. West of Columbus the line will utilize the T.A.T. route, which is already lighted for night flying.

LIEUT. McCONNELL, in charge of Air Corps Reserve flying in Columbus, is jusly proud of the number of Reserve officers who have turned out for flying at Norton Field since the beginning of this fiscal year on July 1st. Old Air Service men may find some familiar names among the following officers who have so far reported or Norton Field: Majors William F. Centner and D. H. Young, Columbus, and A. H. Tabor, Welch, West Virginia; Captains R. A. Kelly, Xenia; J. L. Zimmerman, Mansfield; A. A. Price, of West Virginia; McQuilkin of Cleveland; John MacCready of Dayton, and John E. Davis, Grant Melvin, and Robert Bohannon, Columbus; Lieutenants D. B. Belt, Thornville; L. A. Carlson, Cleveland; Ralph A. Gardner, Toledo; Waldo H. Rose, Lima; J. C. Schroeter, Marion; W. T. Cotner, Van Wert; J. C. Jergensmeier, Logan; Sloan Canton; M. F. Yoxtheimer, Wellington, and Dean P. Evans, Albert E. Harter, Sam H. Sharp, Randall M. Mitchell, George C. Price, R. H. Spiers, Roscoe C. Aukerman, D. E. Hamiel, Phil L. Williams, Ralph B. Scott, Richard Morehouse, and Don Walter, all of Columbus.

With only three PT's to fly, we feel that this is an exceptionally good showing. It is believed that this record is probably as good as that of any Reserve field in the country. Lieutenant McConnell is certainly to be congratulated upon his success in getting the boys out and making it interesting for them at this station.

SPACE in a factory building for the construction of an experimental glider has been furnished free of charge to members of the Dayton Glider Club of Dayton, Ohio, through the courtesy of the Dayton Chamber of Commerce. Construction of the glider has been started by members of the club and will be completed within three months, according to the present plans.

MICHIGAN

[K. F. ZEISLER]

WITH but one month gone in the new year, Michigan's airlines, airports and aircraft plants have already given an indication that expansion and progress will be the keynote of 1930 in this state. Stout Air Services, Inc., recently carried its millionth passenger, and a few days later announced fare reductions on its Detroit-Cleveland and Detroit-Chicago passenger lines that bring

(*Continued on next page*)

Announcing The Most Remarkable Plane in Aviation History

The Aeronca C-2 opens a new era in aviation. Its design and construction is the result of courage and vision on the part of its creators. All precedents and tendencies were forgotten in the desire to build a plane which is far lower in initial cost and cheaper to operate than any automobile . . . a plane which the average man can fly safely and own proudly.

A steep take-off after a 5-second run. Unusual design and remarkable aerodynamic efficiency make this maneuver easy . . . and safe.

Gliding 32 miles with a dead stick. From 16,500 feet, the Aeronca will glide to any spot in a circle 200 miles in circumference.

Its weight of only 400 lbs. with gas and oil permits easy handling . . . during spectacular maneuvers aloft or in hauling about on the ground.

The Aeronca C-2 is the result of 3 years study, development and intensive testing. Unparalleled combinations of wing span and power loading provide as great an inherent degree of safety as it is possible to attain in any airplane. Its motor is just as unique and conforms exactly to the aerodynamic principles of the plane itself. It develops 30 H. P. at 2500 R.P.M. on 2 gallons of gasoline an hour. And an hour at cruising speed means 65 to 70 miles.

The Aeronca C-2 is the answer to aviation's greatest needs. Student fliers can cut their training costs in half; sportsmen can at last enjoy the pleasure of infinite freedom and the thrill of whistling wind and speed in their own plane; flying clubs can buy and operate their plane at a very low figure; aviation schools can reduce their fees and double and treble their enrollment. In short, the Aeronca C-2 is what the country has been waiting for . . . the first absolutely safe, practical and economical light airplane.

The Aeronca C-2 is built in its own factory. The entire plane . . . except instruments and tires . . . is under direct control of the manufacturer. *There is only one profit.* The production of every part is certified . . . which means that every Aeronca C-2 is assured of a superiority in design, style, finish, performance, dependability and economy. All in all, the Aeronca C-2 is a value far in excess of any plane on the market today. For further details, write immediately.

AERONCA

Jean A. Roche', Senior Aeronautical Engineer of the U. S. Army Air Corps, designed the Aeronca C-2 and its special motor.

AERONAUTICAL CORPORATION OF AMERICA

LUNKEN AIRPORT . . . . CINCINNATI, OHIO

(*Michigan News continued*)

air tickets within the range of Pullman fares. Packard Motor Company will have its million dollar Diesel aircraft engine plant in operation by midsummer, Alvan Macauley, president, has announced. Thompson Aeronautical Corp., air mail operators in Michigan, has prepared plans for expanding its state-wide services by an additional line north, and increased passenger service on its lines already established.

The Grand Rapids Railroad company, operating street cars and busses in Grand Rapids, Mich., on January 1 took over the city's taxicab companies and announced a hook-up with the Furniture Capital Air Service, Inc., whereby air passengers may call a taxi which will take them to the airport and deliver an airplane ticket. Jack Byrnes, president of the Furniture Capital Air Service, announces the inauguration of a regular Northern Michigan passenger service between Grand Rapids and Mackinaw City, with stops at Muskegon, Manistee, Ludington, Traverse City and Cadillac.

R. C. "Tex" Marshall, vice president and general manager of the Thompson Aeronautical Corp., recently announced that T. A. C. is preparing to extend its present lines, serving thirteen Michigan cities, to Manistee and Petoskey, and that it will inaugurate a passenger service on all its present mail and express lines. Additional amphibion service between Detroit and Cleveland is also planned when the line reopens in April. With headquarters established in the new $110,000 hangar and shops at the Pontiac Municipal Airport, the Thompson firm is installing a weather bureau and radio transmision apparatus at Pontiac, Kalamazoo and Bay City. Hourly weather reports, prepared by the U. S. Weather Bureau, will be broadcast hourly to all T. A. C. planes in flight from these stations, which are to be linked with Central weather stations at Detroit and Lansing. The Thompson planes will also utilize the beam radio system being installed at the Wayne County Airport by the Department of Commerce.

Five new dealers for Wright aircraft power plants have been named by Thompson officials in Michigan, Ohio and Indiana, for which territory it holds the Wright franchise. These dealers are: Curtiss-Wright Flying Service, Columbus; Johnson Flying Services, Dayton; Becker-Former Flying Service, Jackson; Furniture Capital Airways, Grand Rapids; and United Air Service and Transport Co., Detroit.

THE Michigan State Board of Aeronautics recently opened state offices in Lansing and drafted a state aircraft code as its first accomplishments of 1930. The offices are located in the Capital National Bank building, Lansing, and are under the direction of Louis Firsht, assistant director of aeronautics. Mr. Firsht and Capt. Ray Collins, director, have completed a draft of the state air code, which is now in the hands of the Department of Commerce for approval. The code follows closely the Federal regulations, but includes phases of aviation beyond the control of the Federal department. An airport and pilot examiner will soon be added to Capt. Collins' staff.

DETROIT

THE Detroit Aircraft Corporation has announced that gliders which were formerly sold for $585 by Gliders, Inc., a division of the Detroit corporation, will be manufactured and sold for $435. Gliders, Inc., was recently acquired by the Detroit Aircraft Corporation and the reduction in the cost of the gliders is made possible as the result of increased production facilities, it was announced.

C. R. Norton has been appointed Eastern sales representative by the Detroit Aircraft Corporation. Mr. Norton's headquarters will be located in New York City and he will have supervision of sales throughout the Eastern states. He was formerly sales manager of the Packard Motor Company.

FOLLOWING preliminary Approved Type Certificate tests of an Eastman flying boat made recently by a Department of Commerce inspector, the flying boat was frozen in by the ice of the Detroit River. Further tests were continued when the boat had been chopped free, and the take-offs and landings were then made on the ice surface, the metal hull being utilized as landing gear. One-half the time required for a water take-off was used in the take-off from the ice. After the tests were completed, the ship was landed in three feet of snow at the Grosse Ile Airport, the landing time being about the same as that required on water. The metal hull was undamaged by the landings, according to officials of the Detroit Aircraft Corporation, manufacturer of the Eastman flying boat.

WISCONSIN

[W. SCOLLARD]

MILWAUKEE County Airport has been chosen as a permanent terminal of the Kohler Aviation Corporation, it was announced recently. The county airport will be used only by the service planes of the Kohler company operating on the route of the firm across Lake Michigan.

Hangar space for one Loening amphibion, office and locker space, and permission to sell tickets at the field are included in the contract between the company and the Milwaukee county board's committee on highways.

THE Milwaukee Association of Commerce, in coöperation with the committee on aviation of the Wisconsin State Legislature will soon make a state-wide survey to determine the number and location of airports and landing fields in Wisconsin. Each community in the state is to receive a questionnaire upon its facilities for air travel.

The Wisconsin legislative committee on aviation recently went to Washington to confer with national executives on the state's aerial problems. The interim committee made a special study of Government regulations of aviation. Its report will be submitted at the next session.

ACCORDING to the annual report of Jerome C. Dretzka, secretary of the Milwaukee county park commission, a total of 2,813 airplanes, carrying 3,487 passengers, arrived and departed at the Milwaukee County Airport during 1929. Departing air mail poundage amounted to 39,705 pounds and incoming mail totaled 21,501 pounds. During the year of 1929, a Hinds-Crouse

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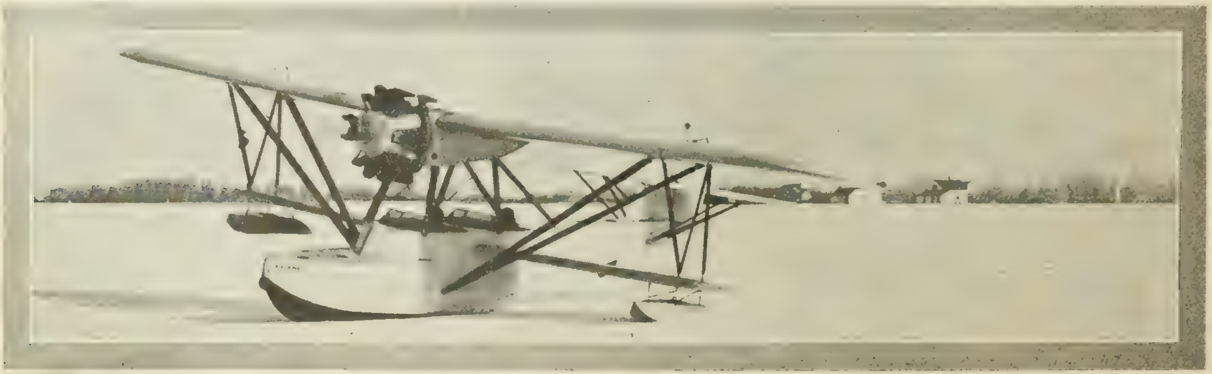
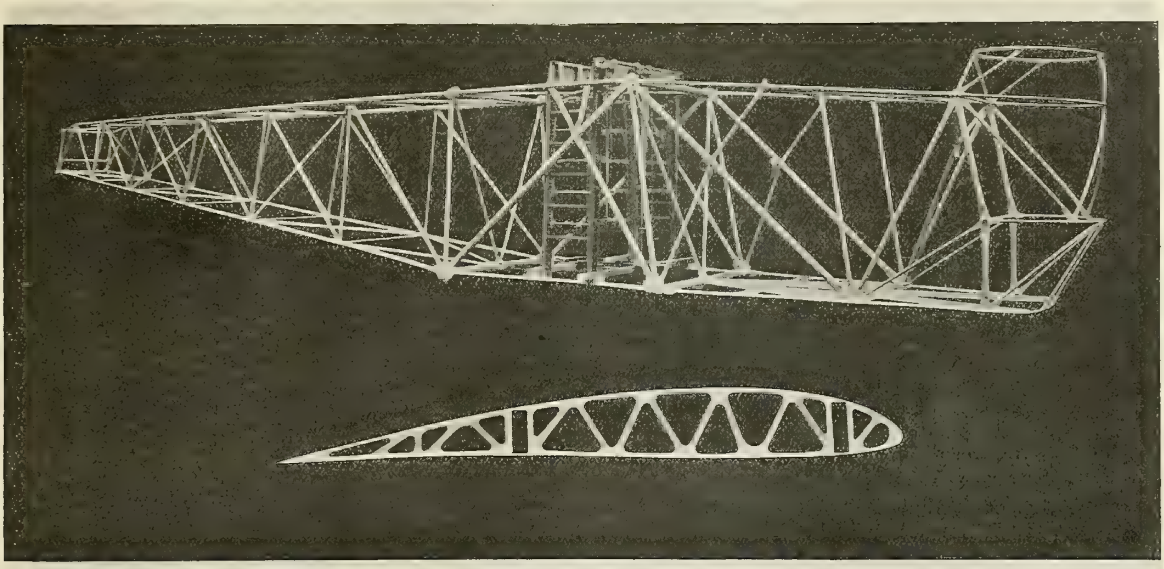


An Eastman flying boat, manufactured by the Detroit Aircraft Corp., after landing on the snow at Grosse Ile Airport



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ALCOA ALUMINUM—LIGHT—STRONG—DURABLE

Through the development of the light, strong Alloys of Alcoa Aluminum, aviation can, and does, have the use of a metal that combines extreme lightness with high strength.

Made of Alcoa Aluminum Alloy, the wing rib illustrated above was stamped in one piece. It weighs only .59 lbs. and yet is capable of bearing 535 lbs. of evenly distributed load without yielding.

Alcoa Aluminum Alloys, having a minimum strength of 55,000 lbs. per square inch, have been developed in sheet and castings; higher strengths in forgings.

Aluminum Company of America offers a dependable supply of sheet and tube; of castings, forgings, draw press products, wire, bar, rod and screw machine parts, made of Alcoa Aluminum and its light, strong Alloys.

Our nearest office will be glad to discuss the fabrication of Alcoa Aluminum for any type of aircraft construction. ALUMINUM COMPANY *of* AMERICA; 2484 Oliver Building, PITTSBURGH, PENNSYLVANIA. Offices in 19 Principal American Cities.

ALCOA

ALCOA ALUMINUM

(*Wisconsin News continued*)

beacon, a Zeppelin wind indicator to replace the usual sock, and gasoline pits with electrical pumping apparatus were installed at the field. On January 1, 1930, supervision of the Milwaukee County Airport was changed from the county park commission to the county board's committee on highways.

ILLINOIS

FOUR loops in succession were performed in a glider recently by Edward B. Heath, president of the Heath Airplane Company of Chicago. The flight was made from the experimental field of the Heath company east of Des Plaines. Mr. Heath piloted a glider which was towed by an airplane, according to the report, and the four loops were made during a descent from an altitude of 1,200 feet where the glider was cut loose. The glider was attached to the plane by 500 feet of steel cable.

Heath flew a glider of the biplane type manufactured by the Heath company. Considerable altitude was lost when the first loop was completed, according to the report, but three more were executed before the glider landed, touching the earth within a few feet from the point of take-off.

J. T. Hartson

J. T. HARTSON has joined the organizations of Air Investors, Inc., and the Comet Engine Corporation, according to a recent announcement of officials of the two firms. Mr. Hartson will direct the sales of the Comet corporation and will coöperate with the research department of Air Investors, Inc., in the preparation of data on aircraft and engine manufacture and aircraft operations.

BENDIX AVIATION CORPORATION has received one of the largest orders for airplane parts and accessories ever placed in the history of the aviation industry from the Stinson Aircraft Corporation, according to Vincent Bendix, president. The order embraces 500 Scintilla magnetos, 500 Stromberg carburetors, 500 Bendix aviation-type brake sets, 300 sets of Eclipse electric starters and 300 sets of Pioneer aviation instruments. This order for parts follows a contract for 500 Lycoming engines which Edward A. Stinson recently announced would be put in a new model cabin plane to be produced on a volume basis.

NEBRASKA

[J. R. LOWELL]

THE year 1929 marked the greatest advances ever made by the aviation industry in Nebraska, and the beginning of 1930 is characterized by forward strides in nearly every city and town in the state. Landing fields have increased until thirty cities and towns now boast of ports for air traffic. This growth in aviation facilities was in a large measure due to the enthusiasm aroused by the state-wide air tour sponsored by the Omaha Chamber of Commerce in September. A larger tour, in number of planes and number of towns to be visited, is being outlined for this year.

Prominent among organizations which have worked for the advancement of aviation in Nebraska in 1929, and which are carrying their efforts on into 1930 with renewed energy, is the American Legion. A standing committee on aviation for 1930 has been named by the Nebraska American Legion with Walter R. Johnson as chairman. Other members of the committee are Dr. O. A. Ralston, John Gottberg, K. O. Davis, M. D. Gulley, C. A. Sluder, Amos Thomas, Rev. H. C. Capsey, and Dr. R. H. Gatewood.

The Omaha post of the American Legion during 1930 will complete a survey of airways leading into Omaha with a view to aiding the future development of the city as an air center. Legionnaires who were either fliers or observers during the world war have been selected to make the survey. Fred Rankin has been named chairman of the committee composed of Arvid Almgren, Fred Kirkland, Earl Kiplinger, Dan Miller and Harry S. Howes.

KANSAS

FOLLOWING the recent destruction by fire of the administration building of the Braley School of Flying, Braley Airport, Wichita, Kan., the board of directors of the institution voted to rebuild the structure immediately. The school will continue regular flying and ground school instruction without interruption, and space in the school dormitory will be utilized until the construction of the new administration building has been completed, according to an announcement of officials of the school.

AT a meeting of the board of directors of the Stearman Aircraft Company, Wichita, Kansas, held on January 11 the following officers and directors were installed: Lloyd C. Stearman, president; Walter P. Innes, Jr., vice president and general manager; Mac Short, vice president in charge of engineering; J. E. Schaefer, secretary, and H. A. Dillon, Frederick R. Rentschler and William E. Boeing, directors.

Following the acquisition of the Stearman Aircraft Company by United Aircraft and Transport Corporation, the executive personnel of the Stearman company was changed as a result of a reorganization program effected by the United corporation. The former board of directors whose resignations were accepted January 4 included the following: J. E. Schaefer, G. M. Brown, C. L. Henderson, J. O. Davidson, Ralph Middlekauf, George Siefkin, H. M. Steinbuchel, and Robert E. Gross.

TEXAS

[M. COOPER]

WITH the beginning of 1930 four new airlines operating out of San Antonio will be inaugurated according to the plans of various Texas airline organizations. On January 1 a daily passenger service was started between San Antonio and San Angelo by the Cromwell Air Lines, Inc. The schedule of the line calls for daily runs to and from San Antonio. Two Stinson and one Lockheed Vega cabin planes are used on the run.

A mail concession between San Antonio and Houston has been granted the Southern Air Transport and it is likely that the run between these two cities will be added to the present list of lines of that organization. Travel Air planes, as used by that organization on its lines from San Antonio to Brownsville, Dallas, and to Ft. Worth, will operate over the San Antonio-Houston line.

Major Frederick Lord, world war pilot, will inaugurate a service between San Antonio and Laredo the early part of February. This line will extend as far as Saltilla, Mexico, making connections with various Mexican airlines in Monterey and San Luis Potosi. He will use Bellanca cabin planes over this line.

With the extension of the Southern Transcontinental Air Route to be inaugurated in the early spring San Antonio will have a passenger service to El Paso, making connection there with the Western Air Express lines to the Pacific Coast.

MISSOURI

THE balance sheet of the Nicholas-Beazley Airplane Co., Inc., of Marshal, Mo., as of November 30, 1929, covering eleven months of operation was recently made public by Russell Nicholas, president of the corporation. The report shows total assets amounting to $871,391, which include cash, call loans and accounts receivable of $138,593.72 and factory, equipment and inventory totaling $732,797.28. Total liabilities are given as $42,767.41, which are made

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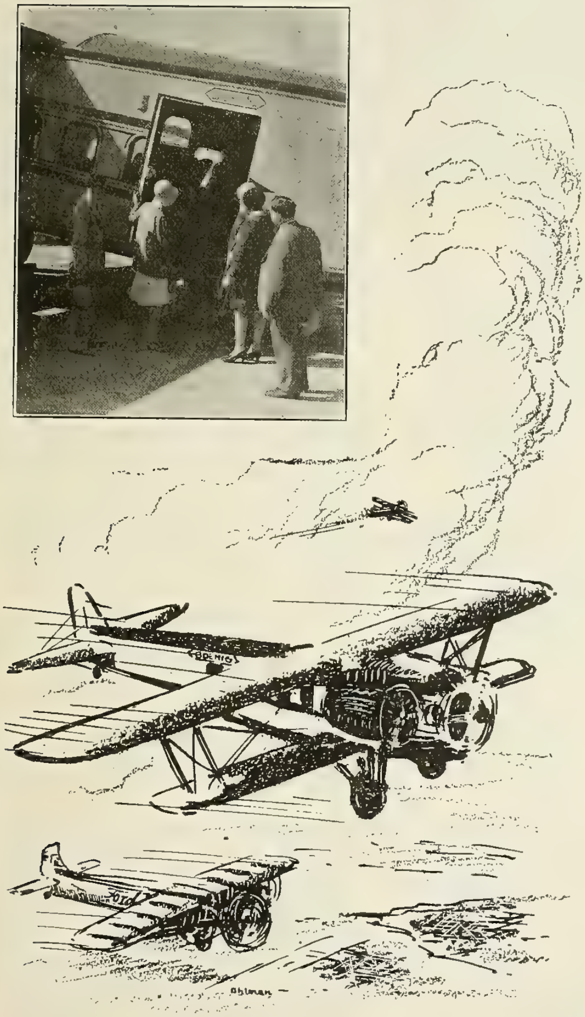
Solving Aviation's Passenger Comfort Problem



Before commercial Aviation could offer the public comfortable air travel they had to overcome two disturbing factors—*Sound* and *Vibration.* Aviation engineers experimenting with numerous materials, to solve this problem found they required the material to be light in weight, of great structural strength and to possess high insulation and isolation efficiency.

Genuine Lata Balsa wood—the only properly kiln dried and heat treated lumber solved this vital problem and it is now extensively used by the outstanding commercial cabin plane manufacturers engaged in passenger service for insulation, streamlining, farings, trailing edges and struts. Ford All Metal Cabin planes are built with Lata Balsa panels surfaced on both sides with fire proofed duralumin veneer. The cabin interiors of Boeing transports are insulated with Lata Balsa mahogany plywood panels to overcome the sound and vibration of the three motors.

If you are not yet familiar with the practical qualities of Genuine Lata Balsa insulation lumber, our engineers will gladly tell you more about it.

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158 Pioneer St., Brooklyn, N. Y.

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FRANK PAXTON LUMBER CO.
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Los Angeles, Calif.
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LIGHT AS THE AIR

LATA BALSA WOOD

THE WOOD OF LITTLE WEIGHT AND MANY USES

(*Missouri News continued*)

up of accounts payable, $30,442.40 and customers deposits, $12,325.01.

The report shows a ratio of assets to liabilities of 20.5 to 1. Reports from field men indicate a very satisfactory outlook for 1930 business in preparation for which deliveries are already being made, the South and West Coasts being most active, according to Mr. Nicholas' statement.

KANSAS CITY

[H. H. JAMES]

THE story of the development of Fairfax Airport at Kansas City during 1929 is told in figures by the Woods Brothers Corporation in a statement recently issued. During the year the Woods Brothers organization spent $429,000 in the improvement of the field. This included new buildings, runways, drainage, lighting and the sinking of gas wells and laying of gas mains from the wells to the buidings. The Curtiss-Wright Flying Service spent $225,000 at the airport; Universal Aviation Corporation $135,000; the American Eagle Aircraft Corporation development in the year was $138,000 in addition to large previous expenditures; National Air Industries, $100,000 and several other organizations contributed smaller sums.

The 1930 program for the airport includes $200,000 for additional paving, the contracts for which already have been awarded; $118,000 for the completion of the airport terminal building now under construction; $90,000 for new hangars; $70,000 for a student dormitory; $35,000 for additions to the sewage and drainage systems and $40,000 for other buildings. These figures do not include the expenditures to be made at the airport by manufacturing concerns that have purchased sites at the airport for airplane factories or for the development of concerns now located there.

A STEADY expansion program that resulted in a 15 per cent increase in gross sales, enlargement of factory facilities, expansion of its sales organization and the acquisition of new units, is shown in the annual report of the American Eagle Aircraft Corporation for 1929, recently made public by E. E. Porterfield, Jr., president of the corporation.

Comparative figures cited by Mr. Porterfield in his statement showed that the firm's business in July, 1929, was $60,582 more than that of the same month in 1928; August, 1929, was $20,875 over August, 1928, and the increase in September was $27,737, and in October $49,206. D. L. Chick, treasurere of the company, stated that there had been a substantial increase in the parts and reconditioning business of the company. The figure for 1929 was approximately $116,677 as compared to $9,470 for the previous year.

During the year the American Eagle completed its $250,000 factory building at Fairfax Airport. The company, organized in 1925, has outgrown four factories. As a part of a reorganization program the Porterfield Aviation Interests, Inc., was formed within the American Eagle organization, its purpose being to provide a holding company for aircraft and aeronautical accessory concerns. The first of these concerns to be acquired was the Wallace Aircraft Co., In., of Chicago, builder of the Wallace Tourplane, a three-place folding-wing cabin monoplane.

The sales expansion of the company included the formation of three factory branches incorporated under the states in which they are located. These are located at the Wozld-Chamberlain Field, Minneapolis, Minn.; Love Field, Dallas, Tex., and the Grand Central Air Terminal, Glendale, Calif. D. H. Hallowell is the sales manager of the company.

THE new $60,000 passenger station and office building at the Kansas City Municipal Airport has been completed and officially dedicated by City Manager H. F. McElroy. Besides the accommodations for incoming and outgoing passengers on the air transport lines using the Municipal Airport, the station also has office quarters for the field manager and the different transport lines operating from the field.

WALDRON WILLIAMS, division traffic agent at Kansas City for Transcontinental Air Transport since the establishment of that service last summer, has been transferred to St. Louis. He is succeeded at Kansas City by J. C. Graves, who has been a district traffic agent for the lines in St. Louis.

A PLAN to change the eastern terminal of the Mid-Continental Air Express from Kansas City to Wichita, Kansas, is being considered by officials of the company. The line now operates between Kansas City and Denver. It is affiliated with the Western Air Express and operates parallel with that line between Kansas City and Wichita. If the change is made Denver passengers from Kansas City will board W. A. E. planes and transfer at Wichita.

THE Art Goebel Flying School at the Municipal Airport, Kansas City, recently passed the tests of the Bureau of Aeronautics of the Department of Commerce and becomes one of the thirty-one schools in the United States with such a rating. Two other Kansas City schools hold approvals—the Curtiss-Wright Flying Service school, and the school of the Universal Aviation Corporation, formerly connected with the American Eagle Aircraft Corporation.

Attendance at the school this winter has held up well with officials claiming 55 per cent of the total enrollment of flying school students in Kansas City. H. F. Back has been added to the faculty of the Art Goebel Flying School. He is in charge of the home study course now offered by the school in preparing prospective students for actual flying instructions.

LATHROP TRADE SCHOOL, operated by the public school system of Kansas City, is to have a class in aviation. Equipment for the school, supplied by the Government, is now being received. The class will be limited this year to twenty students.

ST. LOUIS

[A. W. LEAGUE]

BERNARD VON HOFFMANN was recently elected president of the Von Hoffmann Aircraft Corporation, succeeding his father, Albert Von Hoffmann, who will continue as a director of the concern. O. R. Hauter, formerly with the Alexander Eaglerock Company, was elected vice president to fill the vacancy caused by the promotion of Bernard Von Hoffmann. The Von Hoffmann company operates the Von Hoffman Aircraft School and has sales agencies for Eaglerock, Cardinal and Avro Avian planes.

All planes of the Von Hoffmann Aircraft Corporation used in its school and training services are to be repainted blue and gold, and new planes ordered for the company will be painted in these colors at the factory. The Von Hoffmann Aircraft Corporation has been appointed local representative for Berry Brothers, makers of Berryloid airplane finishes.

THE Curtiss-Robertson Airplane Manufacturing Company of St. Louis produced 562 Robin planes valued at $3,249,000 during 1929. Production was about equally divided between ships with OX engines and those with Challenger and Wright power plants. Altogether 286 Challenger and Wright-engined Robins were built, and the OX-engined Robins numbered 276. Of the total number of planes produced, 516 were delivered to distributors or individuals.

In addition to the standard Robin, the Curtiss-Robertson Company will produce a de luxe Robin and a four-place Robin in 1930. The de luxe ship is to be a standard model with special finish, while the four-place plane will have two sets of side-by-side seats with dual controls and an automatic starter. The four-place ship is wider than the standard model.

A NEW wind vane and anemometer have been installed on the weather station at the St. Louis Municipal Airport. These instruments are the first to arrive of a shipment of modern meterological instruments consigned to the St. Louis field by the Government weather bureau.

Installation of a radio beacon system at the St. Louis Municipal Airport, and at Kansas City and Omaha airports to facilitate the movement of mail and passenger planes in foggy weather has been started by the Department of Commerce.

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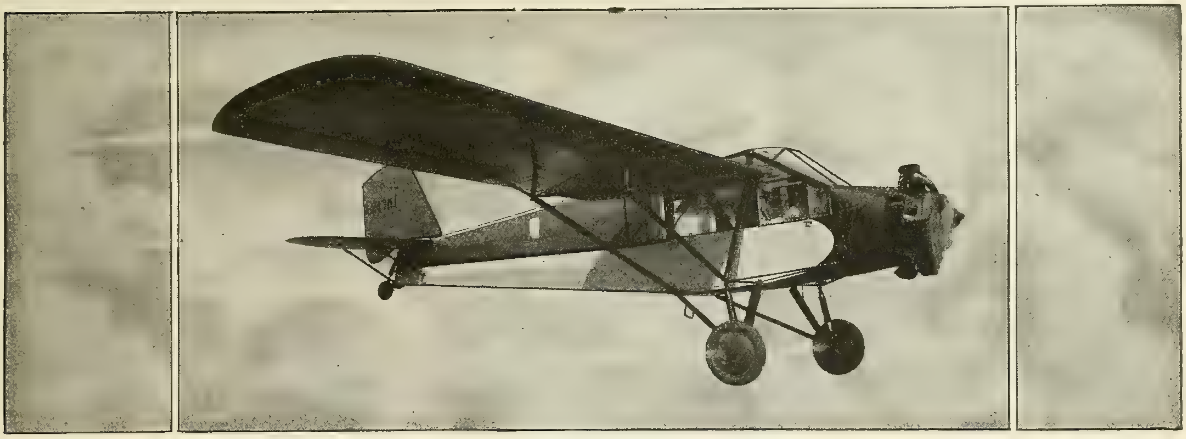


THE NEW B/J--The First Full Vision Plane

NOW—an enclosed plane without a blind spot. The B/J engineering staff, drawn together for the pioneering of new designs for military planes, has carried this same original designing into a two-place tandem monoplane for commercial, private or training use.

The result is that the first commercial B/J embodies a new wing arrangement that affords full vision in all directions.

Seated at the controls of the new B/J, the pilot commands a full, clear view . . . overhead . . . above and below the wing on either side . . . and to the rear. By a movement of the eye or turn of the head he views the entire cyclorama of land and sky.

The ample side windows, of shatterproof glass, may be opened or closed at will.

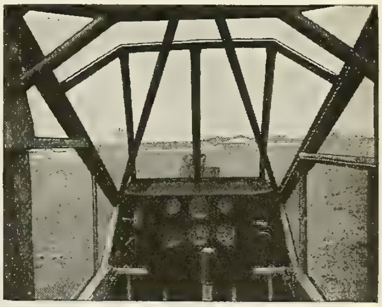
Combined with this unique full vision design are remarkable stability, easy yet positive controls, and numerous other features which make the B/J especially suited for student training or private flying.

The advanced design of control surfaces and gear afford a degree of manoeuverability and control comparable to that of military aircraft. High cruising speed, ample fuel capacity and relatively small fuel consumption result in a wide cruising range. A high angle of climb, slow landing speed and wheel brakes make the plane well adapted for small field operations and for private use.

Setting new standards in ease of handling and in safe, comfortable, care-free flying, the B/J is a "Pacemaker of the Air" in salability as well as in performance. Write for further information about this new B/J, and about distributor territories still open.

A view inside the comfortable, roomy cabin of the new B/J, showing the all-window construction which begins at a level with the pilot's waist and extends above the wing, back beyond the rear seat and across the top.

The pilot of the new B/J has only to move his eyes or turn his head to command a full, clear view in all directions—overhead, above or below the wing on either side, or to the rear.



Taking off or landing, a broad, clear view of both land and sky spreads before the pilot of the new B/J. Equipment includes clock, compass, tachometer, air speed indicator, altimeter, oil pressure, temperature and gasoline gauges.

BERLINER JOYCE AIRCRAFT CORP.

BALTIMORE MARYLAND

"PACEMAKERS OF THE AIR"

(*Missouri News continued*)

A site on the eastern edge of the St. Louis Municipal Airport has been set aside for the beacon. It is expected the system will be in operation some time during the month of February. Radio signals broadcast from the beacon inform pilots of planes equipped with receiving sets when they are drifting to the right or left of their direct course.

WESTERN AIR EXPRESS has opened a ticket office in St. Louis. It is expected that the Los Angeles-Kansas City line of the company will be extended to St. Louis some time this year, according to Harold G. Edgerton, in charge of the office. At present Pullman service is offered passengers to Kansas City where they board a plane for a 12-hour flight to Los Angeles.

Lambert Aircraft Engine Approved

THE Department of Commerce recently issued an Approved Type Certificate for the R-266 aircraft engine manufactured by the Lambert Aircraft Engine Corporation, a subsidiary of the Allied Aviation Industries. The R-26 is a radial air-cooled, five-cylinder engine rated at 90 horsepower at 2,375 revolutions per minute. The design of the engine is conventional in appearance and embodies a method of cylinder assembly designed to eliminate expansion troubles.

HARRY P. MAMMEN, president of Parks Air College, Inc., recently resigned his connection with the school to enter another business. With his brother-in-law, Oliver J. Parks, Mr. Mammen was an organizer of Parks Air College. The Parks enterprises were sold recently to the Detroit Aircraft Corporation.

A total of 13,539 hours was flown at Parks Airport during the calendar year 1929, according to an announcement by Oliver L. Parks, vice president and general manager of the school. Figured on a basis of 80 miles per hour average speed, the total represents 1,083,120 miles of travel. The hourly total was divided as follows: student instruction, 12,107; passenger carrying, 980; test flying, joy hopping, photographic missions and miscellaneous flying, 452 hours.

Recent announcement was made of a new master engine mechanics' training course at Parks Air College. The course, of three months duration, is to be open only to graduates of the Parks Air College school for airplane and engine mechanics and to licensed mechanics. It includes intensive training in the use of shop equipment and the servicing of airplane power plants in every day use on the flying field. The course is designed to turn out specialized engine mechanics and will fit its graduates for immediate service in commercial flying. It was inaugurated in response to a demand for the course by Parks students who intend to enter the employment of the Detroit Aircraft Corporation, of which Parks Air College is a division.

Carrying out its policy of supplying students through a widely distributed sales organization, Parks Air College has opened offices in Toledo, Ohio; Cleveland, Ohio; Denver, Colorado; and Birmingham, Alabama. The sales organization is under the charge of Ernest M. Crosby.

Lieut. Doolittle Resigns from Army to Join Shell Oil Co.

LIEUT. JAMES H. DOOLITTLE of the Army Air Corps has resigned from the Army to enter commercial aviation, according to a recent announcement of officials at Mitchel Field, L. I. He has been appointed head of the aviation division of the Shell Oil Company and will establish headquarters at St. Louis, Mo.

Lieut. Doolittle holds the American speed record for seaplanes of 245 miles per hour, which he established in 1925. In the course of duty with the Air Corps, Lieut. Doolittle was loaned by the Government to the Guggenheim Fund for the Promotion of Aeronautics for the purpose of conducting tests which included the recent blind flying experiment. He was the first American to fly across the Andes Mountains in South America and is credited with being the first flier to make an outside loop.

Flight instructors of the Von Hoffman Aircraft School at Lambert-St. Louis Airport

PARKS AIR COLLEGE of St. Louis, Mo., has opened an office at Denver, Colo., for the purpose of supervising sales in the Denver territory. Ernest M. Crosby, who completed an airplane pilot's course at Parks Air College, has been appointed to head the sales organization established at Denver. The sales office at Denver is an addition to the list of sales offices established by the college at Cleveland and Toledo, Ohio, Birmingham, Ala., and Chicago, Ill. Parks Air College is a division of the Detroit Aircraft Corporation.

TWO plans for development of the St. Louis Municipal Airport, entailing expenditures of $1,138,500 and $812,500 respectively, were submitted to the St. Louis Municipal Airport Commission recently. B. Russell Shaw, head of the engineering firm submitting the reports, estimated that two years would be necessary to complete the original plan. The commission has submitted the plans to the air board of the Chamber of Commerce for approval before making its final report.

The original plan calls for double runways in eight directions so that planes can land and take off simultaneously in all directions. An air terminal building, costing $150,000, is planned for the southeastern corner of the property. The building would serve as headquarters for airlines and other operators at the field and would be equipped with offices for the field manager, weather bureau, radio and other agencies. Cost of the night lighting system is fixed at $50,000 in both estimates. Only the runways would be lighted.

Other items included in the estimates are $5,000 for sewerage; $15,000 for a cafeteria; $100,000 for roads, drives, landscaping and fences; $8,000 for a fire department building; $5,000 for fire fighting equipment; $2,500 for medical equipment, and $2,000 for water supply. An item of $45,000 for grading is reduced to $35.000 in the secondary estimate and one of $20,000 for furniture and fixtures is reduced to $15,000.

WOMEN students will be admitted to flying courses given by Parks Air College, East St. Louis, according to an announcement made by officers of the school on January 1. Women were formerly prohibited from enrolling in the flying school. A night course for airplane and airplane engine mechanics was started on February 1 by the organization. The course includes instruction similar to that given in the day course but requires 27 weeks to complete with classes held on Monday, Wednesday and Friday. The day course for mechanics covers a period of 18 weeks.

KENTUCKY

THE Louisville Board of Park Commissioners at a meeting on January 7 authorized George Kretschmer, president, to negotiate with the Louisville and Jefferson County Air Board relative to

(*Continued on next page*)

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(*Kentucky News continued*)

razing the old Breckinridge residence in Seneca Park, in which Bowman Field is located. The air board is anxious to have all unnecessary and unneeded buildings removed from the field territory.

A MEETING of the Kentucky Air Board was called by Governor Flem D. Sampson on January 15 at Frankfort, Ky., to which airport managers and business men in aviation were invited, for the purpose of discussing enactment of state legislation pertaining to aviation safety measures. It was planned to draft a bill and submit it before the present session of the Kentucky State Legislature.

It was explained that the Kentucky Air Board has adopted the U. S. Department of Commerce regulations pertaining to aviation, but that there is no enforcement machinery set up in the state, or no law under which regulations may be enforced.

The air board is composed of Governor Sampson, chairman; Adj. Gen. W. H. Jones, secretary; C. Frank Dunn, A. H. Bowman, and George D. Converse.

TENNESSEE

[V. MATTHEWS]

THE Nashville Automobile Club recently inaugurated an extension of its service in the dispensation of air transportation information. This action is in accord with the policy adopted by the national organization for coöperating with the aviation industry. Working in conjunction with the Interstate Airlines, Inc., operators of the direct air route from Chicago to Atlanta, via Nashville, the association will take local ticket sales for the company. F. F. Frakes, sales representative of the company, has moved his headquarters to the association offices.

TENNESSEE will have a division of aeronautics as a part of the state highway department through the enactment of an aviation bill in the recent special session of the Tennessee General Assembly. With provision for a maximum budget of $50,000 annually, this division is charged with the duty of providing emergency landing fields, and seeking airport locations over the state. The bill was designed to encourage greater use of airlines in Tennessee.

ALABAMA

[O. G. JONES]

WORK was started recently on the municipal airfield at Greenville, Ala. The field is located three miles east of the city, and the work is being sponsored by the local Lion's Club.

ONEONTA, Alabama, located in a section of the state where airports are scarce, is developing a municipal field. Griffith Irwin, who is directing the work at the Oneonta field, says part of the field is ready for use and the remainder is being pushed to completion as rapidly as possible.

FLORIDA

[J. WRIGHT]

THE first airport in the Everglades section of Florida has been built at Clewiston, on the southwestern shore of Lake Okeechobee. The airport was established by the Southern Sugar Corporation to facilitate aerial surveys of the company's holdings. A hangar has been erected with accommodations for several planes. Neil Stewart is in charge of the port.

THE first meeting of the Florida State Aeronautical Association was held in Miami on January 13th, the date of the opening of the All-American Air Meet. The association was organized during a meeting of prominent aviation leaders held in Tallahassee recently upon call of Governor Carleton for the purpose of coördinating aviation activities in the state and furthering the industry. R. Wallace Davis of Tampa was elected president and Bob C. Smalley, secretary. Governor Carelton was named honorary president.

AN increase in facilities of the Curtiss-Wright Flying Service at the Miami Municipal Airport includes a new $70,000 hangar, which will have administration offices, waiting rooms, shop rooms and instruction rooms. William Van O'Brien is manager at the airport. The marine division of the Curtiss-Wright organization has constructed a new $35,000 base at Biscayne Boulevard and 8th Street. The new base has a modern administration building with waiting rooms. A new ramp and tarmac has been completed, which will accommodate approximately twenty seaplanes. Bases of the marine division have also been established at Nassau and Palm Beach. The number of seaplanes and pilots has been increased to twelve. The planes include Sikorsky, Loening and Ireland amphibions and a Travel Air on pontoons. All seaplanes that do oversea flying to the Bahamas Islands and Cuba are equipped with two-way radio sets.

Harry Rogers is vice president in charge of the marine division and is in charge of operations during the winter. L. W. Botts is vice president of the Florida company and manager at the Miami office.

[J. M. MURRAY]

THE employment of Capt. George K. Perkins and Lieut. Philip Pratt, Army and Navy reserve fliers, as members of the Tampa Airport Site Committee was recently authorized. An invitation was sent by Tampa officials to the New York, Rio and Buenos Aires and the Pitcairn Aviation companies to send technical engineers to Tampa as supplementary members of the airport site board.

The proposed airport is to be constructed at a cost not to exceed $750,000, bonds for which were issued several weeks ago.

IN 1914, the first commercial airline in the world was placed into operation between St. Petersburg and Tampa, Fla., piloted by Tony Janus. The establishment of tht first commercial airline was celebrated January 15th and 16th during the third annual air meet held at Waterfront Park at St. Petersburg.

P. E. Fansler, organizer of the St. Petersburg-Tampa airline, was in attendance at the meet in observance of the commercial line inauguration. Two of the first passengers carried on the service 16 years ago were present also.

Of the backers living who helped observe "Tony Janus" day at the air meet were Lew B. Brown, Arthur Johnson, George Gandy, L. A. Whitney, Soren Lund and C. Perry Snell.

THE Ryan Aircraft Corporation recently appointed Florida State Airways distributor of Ryan planes for the State of Florida. William Lindley, vice-president of the company, will appoint dealers in the principal cities and towns throughout the state.

THE Jacksonville Flying Club was recently organized and named at a recent meeting held in the Graham building, Jacksonville, Fla. The following officers were elected: H. C. Pearce, president; L. J. Sawyer, secretary; A. M. Blendow, H. O. Maloney and J. R. Adams were appointed as a committee on charter and by-laws; W. E. Sawyer, Ralph M. Milam and Ed. Goodman were appointed to the finance committee.

The club is organizing on a plan by which members pay entrance and regular fees for the purchase and maintenance of planes and hiring of instructors to conduct lessons for the group.

DECISION to enlarge and improve the Jacksonville, Fla., Municipal Airport was made by the aviation committee of the city's chamber of commerce in a recent meeting. It voted to make $25,000 available at once for immediate improvements, and recommended that action on a bond issue for further funds be taken in the near future.

TRAVEL by air on the part of the general public during the winter vacation season will be larger than in any year since the Florida real estate boom several years ago, according to a survey of aerial activities in Florida, Cuba and the West Indies recently completed by Pan American Airways, Inc. The survey disclosed that hotels in Miami and other winter vacation resorts have a 60 to 90 per cent greater number of bookings than last year.

New schedules designed for the handling of heavy passenger traffic to Nassau, Cuba and the West Indies has been put into effect by the airways company, and the passenger rates have been reduced approximately 25

(*Continued on page 216*)

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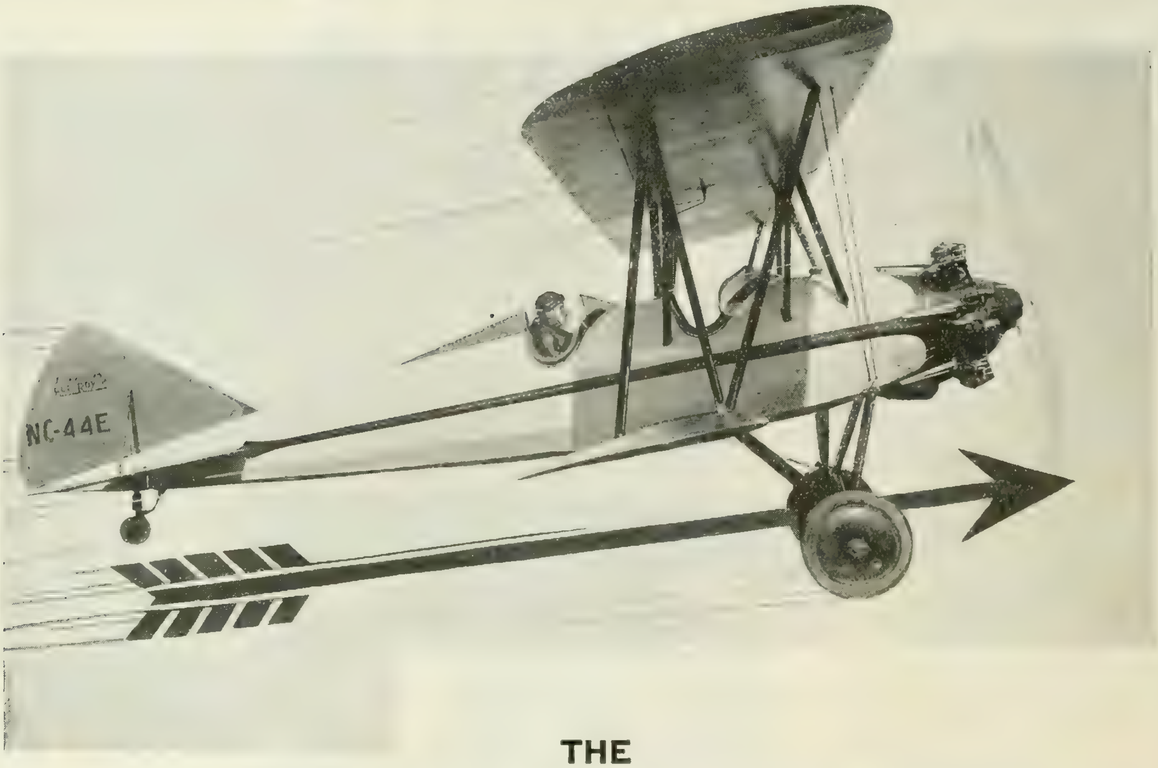

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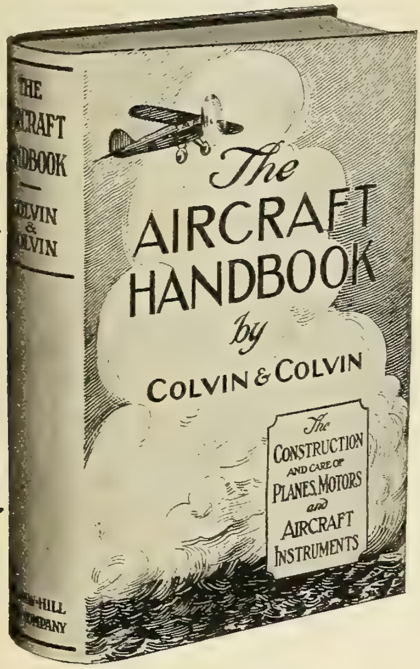
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A. D. 2-30

THE JUNIOR LOCKHEED VEGA

LIGHT WEIGHT R. O. G. TRACTOR GIVING A FINE PERFORMANCE

By R. E. Dowd

PROBABLY if we were to take a vote among our readers as to which full-size plane they liked best, the Lockheed Vega would receive a strong vote. The whole design is so neat and trim, and the lines so beautiful that its popularity is evident everywhere. No doubt you noticed the Vega featured on the cover of AERO DIGEST this month. In addition to its outstanding appearance, this plane has given a wonderful account of its flying ability, piloted by such famous leaders as Miss Earhart, Colonel Lindbergh, Captain Hawks, and Art Goebel. In fact, Colonel Lindbergh's new personal plane, the *Sirius,* is the low-wing version of the original Lockheed Vega.

The outstanding feature of these remarkable planes has been the careful reduction of air resistance. Struts and wire have been eliminated and all parts are effectively streamlined so that with engines of the same power as used in other planes, greater speed and better performance is attained. The fuselage is of laminated wood, built somewhat like a canoe by planking over curved formers and bulkheads. This construction is called "monocoque," after the French name meaning roughly, "one shell." In the early days of flying a French designer named Deperdussin used the monocoque construction, and during the war the German Albatros had a semi-monocoque fuselage, which really is the correct designation for the Lockheed construction, since bulkheads and forming ribs are used in addition to the outer shell.

One great advantage of the monocoque construction is the ease with which streamlined designs can be built, and this we find in the Lockheed. Model builders can profit much by a study of this streamlining. Certainly no model can be called streamlined if the rubber motor is snapping and squirming in the open air as it flies. It even seems ridiculous to take care to streamline skids, propeller bearings, and so forth, while the rubber motor is exposed. Model builders and even designers of full-sized planes are inclined to pass this matter off as unimportant by pointing out the low speed of model flight but this is not justifiable. A simple experiment with a flying model will quickly correct this fallacy. A tuft of cotton is all that is required and the model may be either a paper glider like the Windjammer, a description of which appeared in the August issue, or a power-driven model. Just mount the cotton on the center line of the model near the center of gravity after it has been correctly balanced and note what happens to the performance. If there is still any misgiving about the result because of the additional weight of the cotton, just roll it up into a small ball and replace it on the model. The weight will be found negligible but the resistance of great importance.

For some years I have been advocating progress in model planes along these lines and it was with no small satisfaction that I received recently from my fourteen-year-old brother, Leslie, a model Lockheed Vega, as he called it, all complete and in flying condition. The design and construction are entirely his own, and I was simply called on to witness the performance. Perhaps we can accept this as Leslies appraisal of his big brother's usefulness and ability, but certainly Les has done a very fine job. It is with a great deal of pleasure that we offer drawings and description of this little plane, which has a streamlined monocoque fuselage, cantilever (internally braced) wings and tail surfaces just like the full-sized Lockheed which we all admire.

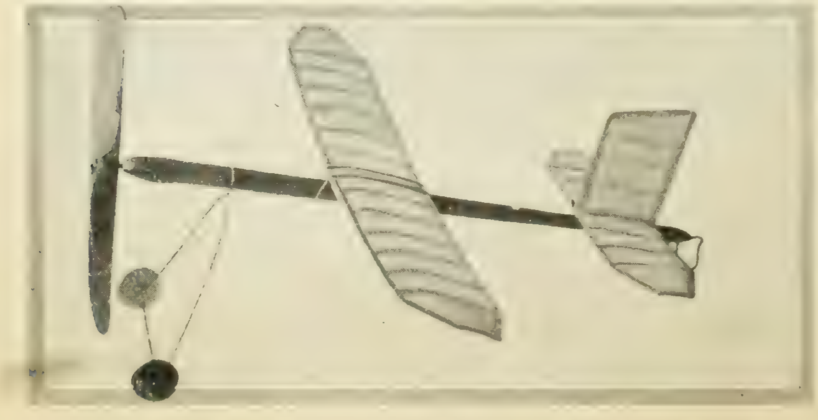
The Junior Lockheed Vega, as we have decided to call it, is also no laggard on performance. But perhaps I ought to let Les tell about it in his own words. He wrote as follows from his kitchen workshop at 71 Avon Place, Springfield, Mass.

"When I finished it I took it down to the garage at 220 Pearl St., made two glides, and then wound it up about fifty turns. I set it on the floor and it was some shock to me to see it run a little ways, take off, go up nearly to the ceiling and make one circle and then land.

"It has since flown thirty seconds, hand wound, and on one flight, in the garage, it took off and without circling, hit the ceiling before going the length of the garage. (Garage about 40 by 50 feet with about 25-foot ceiling—Ed.) I don't know what the rate of climb was but it didn't stall and seemed to be climbing almost vertically! I could bank it vertically and fly around a circle without losing altitude, in fact it gained altitude. I have had it hit the ceiling of the garage three times in one flight. The take-off run was seldom over a foot and a half, and most times it just left the ground without a run.

"I tried both five and six-inch propellers and they seemed to work equally well. When I changed propellers, the only adjustment was moving the wing. This model had the best gliding angle of any of my models and I never had any trouble with it.

"Outdoors, on a calm day, the highest flight I got was about 150 feet. We were in a dingle and there were some high apartment blocks nearby, and it was way over them because it looked to be about five inches big. The flight was well over a minute, and the glide lasted about thirty seconds. I wish you could have seen that flight. Do you remember the flight we had with the single pusher? Well, this was second only to that. (The flight referred to



The 12-inch Junior Lockheed Vega flying model described on these pages.

was about 300 foot altitude and over three minutes duration.—Ed.).

"The next time I build a model, I am going to make it streamline including wheels, fin and tail. I will put 'pants' over the wheels and streamline the fin and tail into the fuselage. I think I'll have to get to work on one like that.

"Gee, Ray, I wish we could build a glider next summer. Can't you get time enough off to build one? If you couldn't, do you think another boy and I could 'attack' one under your supervision? I'd like to have a ride in some kind of an air-going machine. I wish I could get a chance to fly in a real airplane before long."

Well, Les, we'll see what we can do about that glider and also the ride in the "air-going machine" by way of appreciation of your efforts in working out the Junior Lockheed. Now to proceed with the model.

Materials Required

Balsa Wood

Name of part	*Dimensions (inches)*	*Pieces*
Spars, fin, stabilizer, wing tips	1/32 x 3/32 x 10	six
Spar	1/16 x 3/32 x 10	one
Fuselage tube, ribs	1/32 x 1¼ x 10	one
Propeller	½ x ¾ x 6	one
Wheels	1/16 x 1 x 2	one
Nose, tail plugs	½ x ½ x 3	one
Incidence block	3/32 x ¼ x ½	one

Other Wood

Name of part	*Material*	*Dimensions*	*Pieces*
Winder	Dowel	⅜ dia. x 7	one
Axle	Bamboo	1/32 x 1/32 x 5	one

Miscellaneous Materials

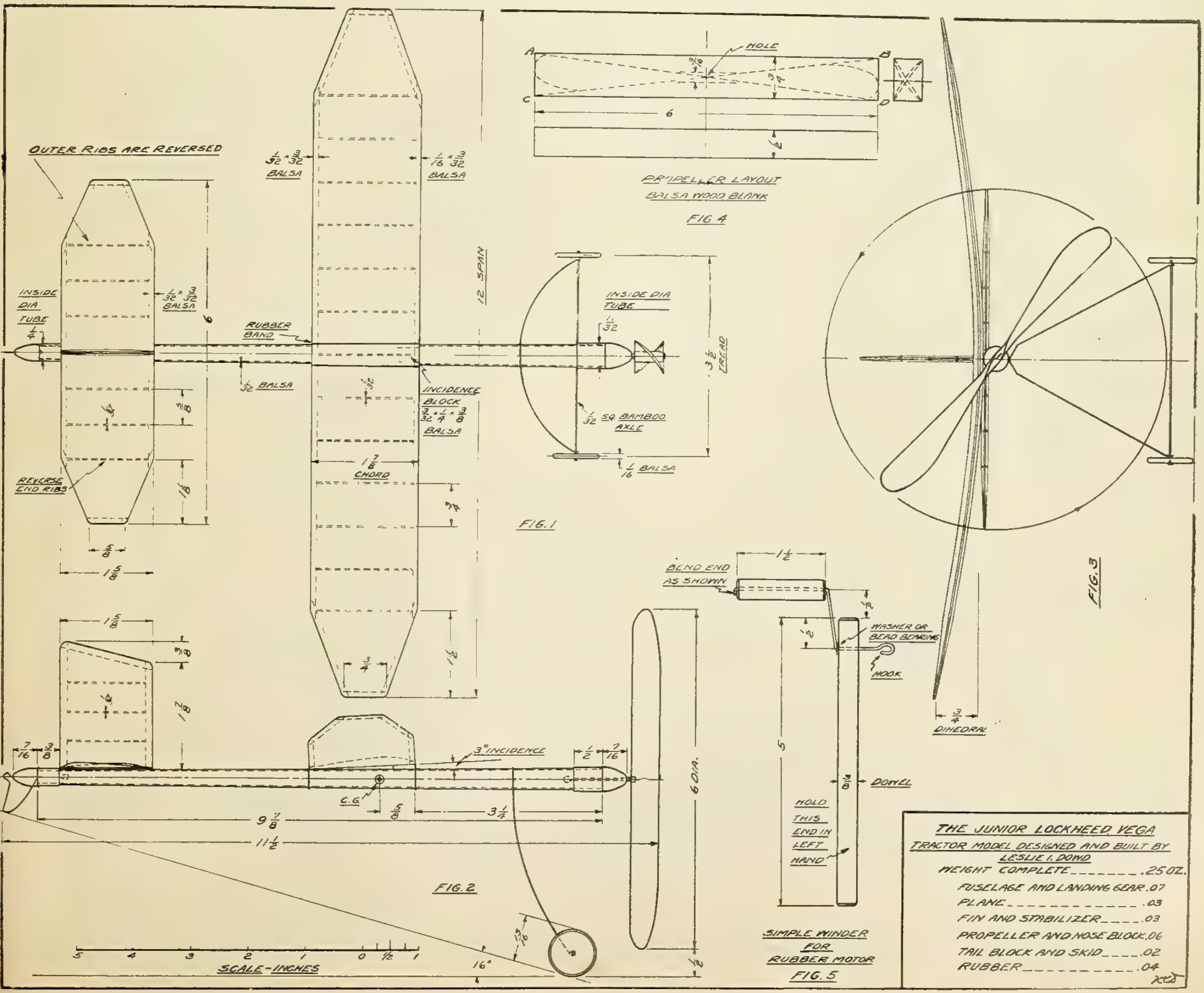
Tapered paint brush handle	For fuselage mold
20-in. music wire about (.015) 1/64-in. dia.	Landing gear, hooks, etc.
One sheet Imperial rice paper	For covering of surfaces
Ambroid cement	General joining of parts
Banana Oil	Dope for paper covering
1/32-in. dia. brass tubing	Propeller bearing
1/16-in. dia. soft iron wire	Winder crank
One washer or glass bead	Winder bearing
⅛-in. flat rubber	Motive power
One rubber band	Plane attachment
One small piece of sheet tin or aluminum	Propeller reinforcement

Before going to work it is well to take time to look over the drawing carefully. It shows three views of the model, with additional details of the propeller blank and a simple winder. Don't let the drawing confuse you because it contains so much information. In order to save space we must crowd our drawings, (see note at end of this article) but if you will just examine each detail carefully you will see that the whole design is really very simple.

Make Fuselage and Landing Gear First

By starting the fuselage first it will be possible to allow plenty of time for it to dry between the different operations, which is an important point. A tapered paint brush handle makes a convenient form if just lightly coated with paraffine, which can be applied by melting or just rubbing on in cake form. An old candle will do nicely. If you can not obtain a brush handle of the exact taper shown, it will simply be necessary to make proper allowances when making the end plugs. The smaller end, however, should not be less than ¼-inch since that is the minimum size which will accommodate our rubber motor.

The 1/32-inch thick balsa is dipped in hot water and wrapped over the form using rubber strands to hold it in shape while drying. When the wood is thoroughly dry, the shape can be trimmed with a razor blade so that an overlap of about ⅛-inch is allowed. Before cementing it is advisable to check the overlap so that the projecting edge on the inside is such that as the rubber unwinds it will ride over this edge. Rubber strand is again used to hold the



THE JUNIOR LOCKHEED VEGA
TRACTOR MODEL DESIGNED AND BUILT BY
LESLIE I. DOWD

WEIGHT COMPLETE	.25 OZ.
FUSELAGE AND LANDING GEAR	.07
PLANE	.03
FIN AND STABILIZER	.03
PROPELLER AND NOSE BLOCK	.06
TAIL BLOCK AND SKID	.02
RUBBER	.04

cemented seam tightly closed until dry.

The end reinforcements are next applied to the ends of the tube. They are also 1/32-inch thick balsa, like the body of the tube. After trimming to length with a razor blade, the tube can be slipped off the form. If any difficulty is experienced due to the cement holding to the form, a little heat will melt the paraffine permitting easy removal.

The end plugs are also simple to make. Just carve the balsa block so that it fits the tube snugly and provide a square flange which fits against the end of the tube. Now, with the plug in place, the streamline shape can be given to the outer end of the blocks. The rear block has a combination inside and outside hook and a tail skid all combined in one piece of wire. The outer hook is for attaching the winder which, of course, turns the whole block. The wire is forced into the block after forming to the skid shape, which prevents the wire from turning in the block. A piece of toothpick or match whittled down and forced through the block, fitting into notches in the end of the tube, is sufficient to take the torque of the rubber motor when wound. The nose block has a piece of brass tubing for a propeller shaft bearing forced through and cemented in place.

The wheels can be cut from balsa wood 1/16-inch thick. They are 13/16-inch in diameter, which is the thickness of a nickel. We suspect that Les used such a token of prosperity for his pattern and, perhaps, it is a pretty good idea since they can be sandpapered round by placing one on each side of the coin. Two nickels, one on either side of the wheel banks would be even better, but it seems a pity to add financial problems to the building of our model!

After shaping the wheels the axle of 1/32-inch square bamboo rounded slightly on the corners is cemented firmly to both wheels so that when mounted both wheels turn together. The remaining part of the landing gear is simply a single piece of wire wrapped around the tube and formed as shown on the drawing. At the bottom the ends are looped around the bamboo axle allowing plenty of freedom for turning. Note that in Figure 1 the axle lies directly under the rear end of the front tube reinforcement.

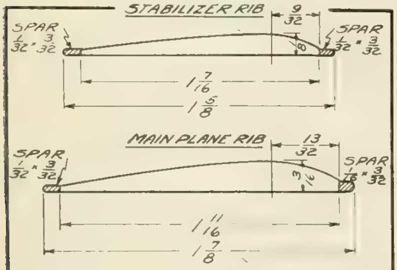
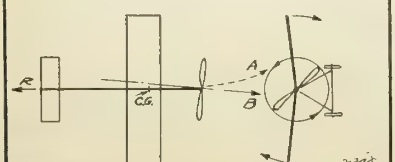


FIG. 6

(All the above dimensions are shown full size)



PROPELLER TORQUE CORRECTION BY OFFSETTING LINE OF THRUST

FIG. 7

Build the Main Plane

Figure 6 gives us the correct rib form for the main plane. Thirteen will be required but you had better make an extra one, for thirteen is believed to be an unlucky number and it surely would be unlucky if you lost or broke one. The best way to proceed is to lay out the exact size of the whole plane on a board and build over the pattern. Using pins to hold the various parts in position, the cement is applied to all the joints, and when dry the finished job can be lifted off the board. The dihedral can be given as the next operation before covering with rice paper. Most of the dihedral will automatically work in as the banana oil "dope" is applied so it is better to give but a slight dihedral before covering. No cement is used to fasten the paper to the frame, the dope being sufficient. In doping, if the frame twists, pin it down to a flat surface when applying additional coats of dope, thinned with acetone, for much depends on the form which the frame takes while the covering is drying. The incidence block, which is slightly grooved to fit the fuselage, is cemented on as the final operation.

Next Make the Tail

The tail surfaces, both stabilizer and fin, are made in the same manner. Figure 6 gives the pattern of the stabilizer rib. As noted on the drawing, the two outer ribs are reversed; that is, they are turned around so that they are backwards. This rather ingenious arrangement was done to make the model more stable, since the regular stabilizer rib is a lifting section like the main plane. It might have been more conventional to mount all the ribs inverted but certainly the model could not be more stable than it is under the reversed rib arrangement. The fin ribs are simply a symmetrical streamline shape. The whole tail assembly can be cemented to the fuselage after covering, care being taken to line the fin up with the center line of the fuselage.

Carving the Propeller

In Figure 4 we have very complete details showing how to lay out and carve the propeller. The diagonal lines AD and BC broadened out at the hub give the blank form and the carving is done from corner to corner of this blank. If care is taken to carve the pitch as shown, the winding by hand will be easier since the turning will be clockwise, which is natural. It is a good plan to pierce the hole before doing any carving in order to get it straight and true. The rounded corners are made only after the carving is pretty well finished. The propeller shaft is next installed and held in place by clinching the wire back into the hub. A thin strip of aluminum, brass or tin, about ⅛-inch wide by ¾-inch long with a hole for the shaft is bent U shaped so as to provide a bearing surface for the end of the tubular bearing projecting from the nose block. Both the clip and the propeller shaft are cemented to the propeller. The hook for the rubber is made last. A single loop (two strands) of ⅛-inch flat rubber is sufficient to power our Junior Lockheed. The knot should be made near the rear hook because the turning is less at that point. Now, if we assemble our plane to the fuselage with a small rubber band and adjust its position so that the center of gravity is ⅝-inch from the leading edge of the plane, as shown in Figure 2, we are ready to fly.

Correcting for Propeller Torque

Propeller torque may sound pretty technical but after all it's simply the tendency of your model to turn around on the propeller shaft. If you wind the propeller a few turns and then suspend the model by the propeller it will rotate slowly. In the air the same tendency is present because the air acts against the propeller. Propeller torque is especially noticeable in models having large propellers and, of course, in the Junior Lockheed our propeller is one-half of our span. Warping the main plane, weighting a wing tip or turning the rudder, all fail as solutions, because the torque varies according to the power of the rubber and we know this power reduces from the maximum at the start to nothing after it runs out. Any correction mentioned would be unbalanced after the torque stopped.

Figure 7 shows a solution worked out by your editor. The front view shows the propeller rotation and the arrows on the wing tips show the tendency of the model to bank. Such banking produces a turning tendency so that the flight path would be shown at A or to the left. Now if the propeller shaft is offset towards B and the air resistance of the whole model is on the center line as R, we have a correcting force in proportion to the thrust and the thrust is in proportion to the power of the rubber motor. It is not necessary to make the offset intentional. The normal inaccuracy of the bearing tube inserted in the block will be found sufficient. Just mark the block and try flying with the mark turned around to different positions. You'll soon find the correct position.

A Simple Winder

By stretching the rubber out as it is wound, more turns can be given. Geared winders to speed up this operation are quite common, but Figure 5 shows a simple winder you can make yourself. Some wire from a package-carrying handle will make a good crank and any dowel will do. It is so small it can be carried in the pocket to the Junior airport.

Flying

Les has given us a good idea of the flying qualities of the model in his letter. It is only necessary to mention that this little model, because of its light weight, is not suited for outdoor flying unless the weather is absolutely calm. All models have a limiting point in regard to the wind they will stand, and light, slow flying models particularly must be flown in a calm.

In conclusion let us resolve to reduce air resistance in our future models by careful

(*Continued on page* 216)

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JUNIOR ACTIVITIES

(*Continued from page* 214)

streamlining and enclosing the rubber motors whenever possible. The world's designers are working on this problem with big planes and it is not too soon for us to apply this knowledge to our models. The Junior Lockheed Vega is a good start. Let's see what more can be done.

Can You Answer These?

What outstanding feature of design is found in Lockheed airplanes?

What type of fuselage is used?

What is a symmetrical section?

What is propeller torque?

Can you explain how it can be corrected?

Is air resistance important in model airplanes?

Can you prove that it is important?

IN response to a general demand, AERO DIGEST has made arrangements to furnish blue prints of some of the models described in Junior Activities Section. Although this has not been done for the models previously described, the complete construction kit containing all materials needed for building the Junior Lockheed and the special winder, together with a full scale blue print, is now available; all small wire parts of the model are completey formed and ready to use. Price $1.00 postpaid. Blue print only, showing the model full size, price 25 cents postpaid. Address inquiries to Junior Activities Department.

(*Florida News continued*)

per cent. The service from Miami to Nassau has been increased by one additional flight daily each way, and the service to San Juan, Santo Domingo, Haiti and points in Cuba beyond Havana has been increased from three round trips a week to four.

MEMBERS of the Pan-American Medical Association took off from Miami on January 24 on an aerial tour of eleven Central and South American countries with equipment for lectures and demonstrations on modern medical practices. The personnel on the tour planned to attend the second annual congress of the Pan-American Medical Association scheduled to open in Panama City on January 30.

The expedition used a specially chartered multi-engined plane equipped with two-way radio, and the route of the tour followed charted mail and passenger air transport routes. The journey, as scheduled, will cover over 6,800 miles.

THE Goodyear-Zeppelin Corporation has established a training school for airship pilots at the Miami Municipal Airport, Miami, Fla. The six lighter-than-air ships which the Goodyear company operates have been based at the airport for use in training the pilots. Baby blimps manufactured by the company will be used to give preliminary training.

Students at the Goodyear training base begin instruction in piloting lighter-than-air

(*Continued on next page*)

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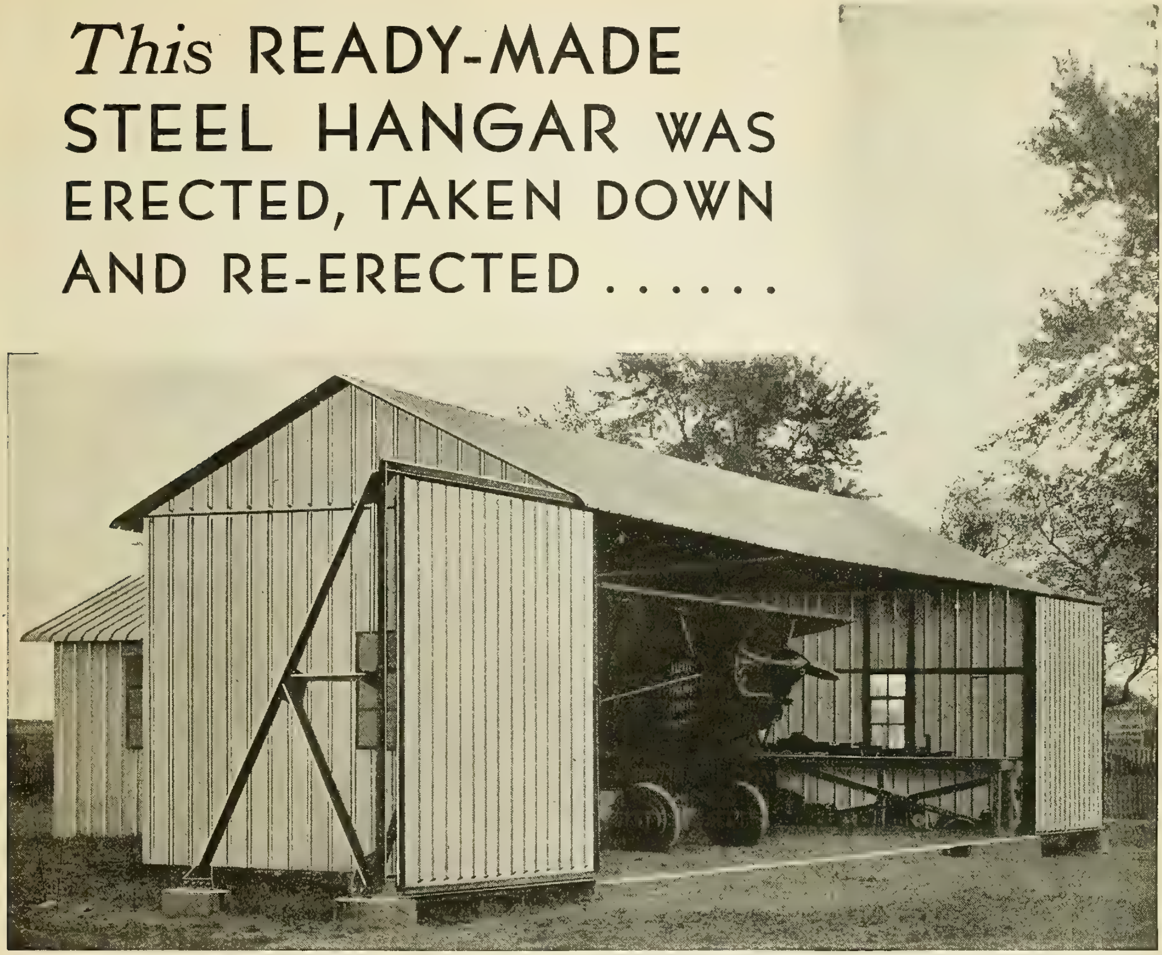

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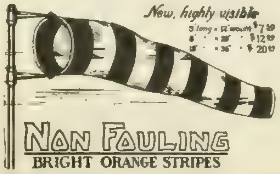

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(Continued from preceding page)

craft on the small blimps; later they receive instruction on the larger airships. The training is designed to basically qualify students for piloting Zeppelins and other large lighter-than-air craft such as the *ZRS*-4 and the *ZRS*-5, construction of which the company has started for the Navy Department in the airship dock and shed at Akron, Ohio. The six airships which the company has based during the winter season at the Miami Airport include the *Defender* and the *Volunteer*, each with a cubic capacity of 160,000 cubic feet, powered with two 150-horsepower engines and with a cruising radius of 1,000 miles; *the Puritan, Mayflower* and *Vigilant*, each with a cubic capacity of 86,000 cubic feet and a cruising radius of 550 miles, the first two named having two 110-horsepower engines each, while the *Vigilant* is powered by two 70-horsepower engines; and the *Pilgrim*, with a cubic capacity of 56,000 cubic feet, and a cruising radius of 400 miles.

CUBA

AN air-rail hookup has been effected by the New York, Rio and Buenos Aires Lines, Inc., and the Seaboard Air Line Railway whereby the former will operate its large twenty-passenger Consolidated flying boats between Miami and Havana connecting with the Seaboard's trains. This connection will enable the railway to offer its patrons 39-hour service between New York and Havana. This service was scheduled to start on February 1st.

THE new General Machado Airport, the Havana base of the Curtiss Wright Flying Service, will be dedicated on February 24th, according to an announcement by W. D. Pawley, manager of the Curtiss-Wright organization at Havana. The airport when completed will have runways in eight directions of 2,600 feet or more. There is under construction at the airport a 120 by 120 foot hangar and a passenger terminal, both of which will be completed in time for the dedication.

The passenger terminal will be a two-story structure with a tower at one end. In addition to waiting rooms, the terminal will have telephone and telegraph offices, restaurant and bar, baggage room, administrative offices and customs and health inspection offices.

A FLEET of six fighting planes for the Cuban Air Corps assembled at Mitchel Field, L. I., recently and took-off on a flight to Havana for use in the Cuban Air Service. The group included three Curtiss Hawk pursuit biplanes and three Vought Corsair observation and attack planes, all powered with Pratt and Whitney Wasp engines.

Capt. Jack Beam and Lieut. J. C. Hodgson, lent to Cuba two years ago by the United States Government to aid in the development of a military air force, took over the equipment and supervised the flight to Cuba. Several pilots of the Cuban Air Corps participated in the flight.

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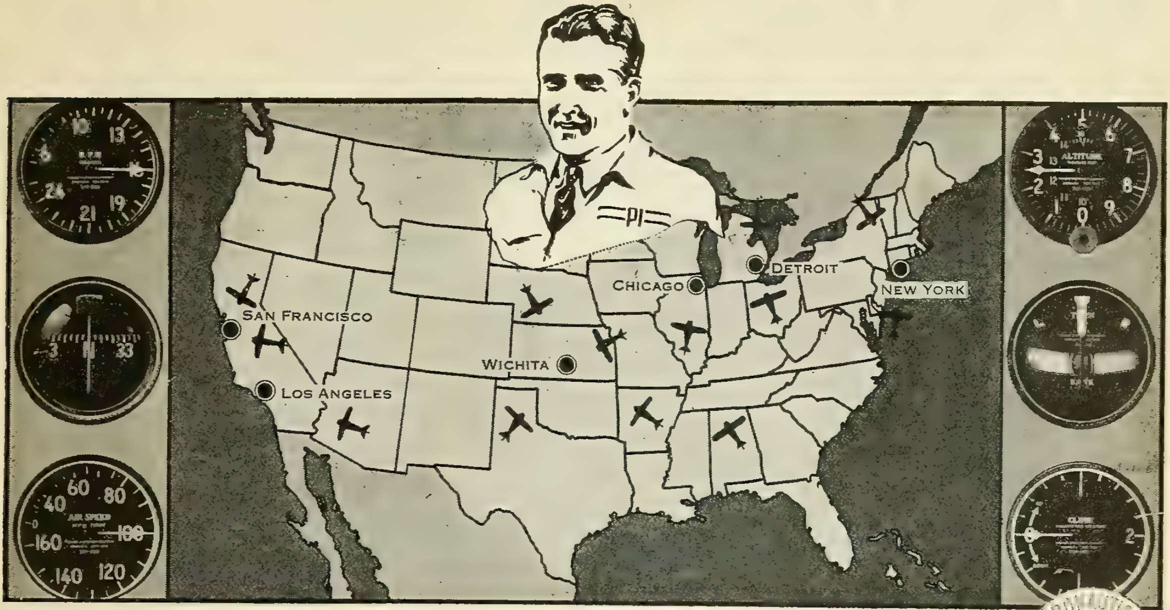

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FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

ENGLAND

THE British Air Ministry has claimed the world's speed record for airships of 81.5 miles per hour made by the *R.100* in a flight over Cardington, England, on January 16. The previous record of 80 miles per hour was set by the *Graf Zeppelin*. The flight was in the nature of an experimental one for speed and turning tests, and lasted approximately thirteen hours. The maximum speed of 81.5 miles per hour on the flight was attained with 600 horsepower in reserve. Radio communications were maintained with the ground throughout the entire flight. Maj. C. F. Scott was in command of the airship on the flight and fifty-eight persons were on board.

EXTENSION of facilities for private owners of airplanes at the London Air Park, Hanworth, has been announced by National Flying Services, Ltd. These facilities will include rental of hangars, inspection and maintenance service, use of shop facilities for overhaul and repairs, demonstration of aircraft, and a system of insurance.

The facilities are available under two systems of maintenance: one system is designed for the average plane owner and includes the rental of a lock-up hangar which will accommodate a folded Moth plane, regular inspection and minor adjustments by a qualified mechanic, and cleaning, oiling and refueling of the plane. The other system is designed for the airplane owner who uses his plane frequently, and includes complete maintenance, care and repair of the machine, leaving nothing to the owner's attention.

An insurance policy up to $4,000 in value for an annual premium of $250 is available to members of National Flying Services, Ltd., who have flown twenty hours including ten hours solo to the satisfaction of the company. The policy covers personal and property damage while flying or taxying, damage occuring in the hangar, and damage done to third parties or property up to $5,000 on each claim.

The organization of National Flying Services has been divided into three divisions at Hanworth—instructional and club flying, taxi and commercial flying, and airplane sales and service. Each division has its own hangars and staff and is operated independently of the others.

A REDUCTION in passenger fares between London and Paris has been announced by Imperial Airways, Ltd., operators of the cross-Channel service. The company has lowered the fare on the plane leaving London for Paris at 8 a. m. from approximately $23 to $17. The fare includes the cost of bus transportation from the center of London or Paris to the airports, and is less than that on a first class boat and train between London and Paris on the Dover-Calais route.

S. A. Thorn, chief test pilot of Cirrus Aero-Engines, Limited, with a new Avian

FRANCE

THE 1930 budget for the French Ministry of Air totaled 2,100,000,000 francs (approximately $84,000,000) when presented recently to the finance committee of the Chamber of Deputies, representing an increase of 200,000,000 francs over the budget of 1929. The 1930 budget was reduced by approximately 60,000,000 francs by the committee, the reduction being a tentative one depending upon the final vote on the budget.

Subsidies for aviation companies included in the 1930 budget totaled 210,150,000 francs ($8,406,000), as compared with 172,300,000 francs in the 1929 budget. Funds for research and experiment included in the 1930 budget total 100,000,000 francs as compared with 120,000,000 francs in 1929.

PLANES operated by the Compagnie Generale Aeropostale of France traveled an estimated total of 1,908,000 miles during 1929, according to a report recently issued by the company. This mileage is an increase over the total of 1,711,200 miles flown by planes operated by the company in 1928, and with 1,358,600 miles in 1927.

The gross receipts of the Compagnie Generale Aeropostale in 1928 totaled 80,068,212 francs (about $3,202,728), as compared with 42,460,313 francs ($1,698,412) in 1927. Government subsidies amounted to 63,950,000 francs and 31,250,000 francs respectively during the two years. The net profit was reported at approximately $70,376 for both years, over half a million dollars having been set aside for a sinking fund in 1928.

Lines operated by the company have a total length of 10,200 miles in length, and include the following divisions: Paris-Madrid, Marseilles-Algiers, and the France-Africa-South America boat service. In Africa the company operates in Morocco and French West Africa, and in South America it operates in Argentina, Brazil, Uruguay and Chile.

GERMANY

[E. P. A. HEINZE]

THE German Zeppelin Company recently issued a statement of the flights so far performed by the *Graf Zeppelin*, which is now undergoing overhaul and re-equipment for the proposed trip to the North Pole.

According to its log book the ship has traversed 116,985 kilometers or approximately 72,720 miles. As the ship has made 50 trips the average distance covered on each is 1,454 miles. The following major flights have been flown by the airship: 1928—Oct. 11-15, Friedrichshafen-Lakehurst, 6,170 miles; Oct. 20-Nov. 1, Lakehurst-Friedrichshafen, 4,537 miles; 1929—March 25-28, Palestine cruise, 4,975 miles; April 23-25, Friedrichshafen-Spain and return, 3,357 miles; Aug. 1-5, Friedrichshafen-Lakehurst, 5,190 miles; Aug. 7-10, Lakehurst-Friedrichshafen, 4,404 miles; Aug. 15-19, Friedrichshafen-Tokio, 6,986 miles; Aug. 23-26, Tokio-Los Angeles, 5,999 miles; Aug. 27-29, Los Angeles-Lakehurst, 2,997 miles; Sept. 1-4, Lakehurst-Friedrichshafen, 5,269 miles; Oct. 15-17, Balkan trip, 2,956 miles.

The length of the trip around the world starting and ending at Friedrichshafen was 21,261 miles, and the tour was accomplished in 20 days and 4 hours including the stops.

On these 50 trips the ship's Maybach engines used 8,301,700 cubic feet of power gas to drive the motors, in addition to 167,963 pounds of gasoline and 33,360 pounds of lubricating oil. Exclusive of the crew 1,574 persons were carried by the craft, an average of 31 on each trip. Mail was carried on 42 trips, and consisted of 820,000 individual packets, letters and postcards. Dry provisions weighing 34,332 pounds and beverages weighing 36,156 pounds were conveyed. Provisions totaled 70,488 pounds and averaged 1,409 pounds on each trip. The total net load transported was 876,678 pounds or an average of 17,523 pounds on each trip.

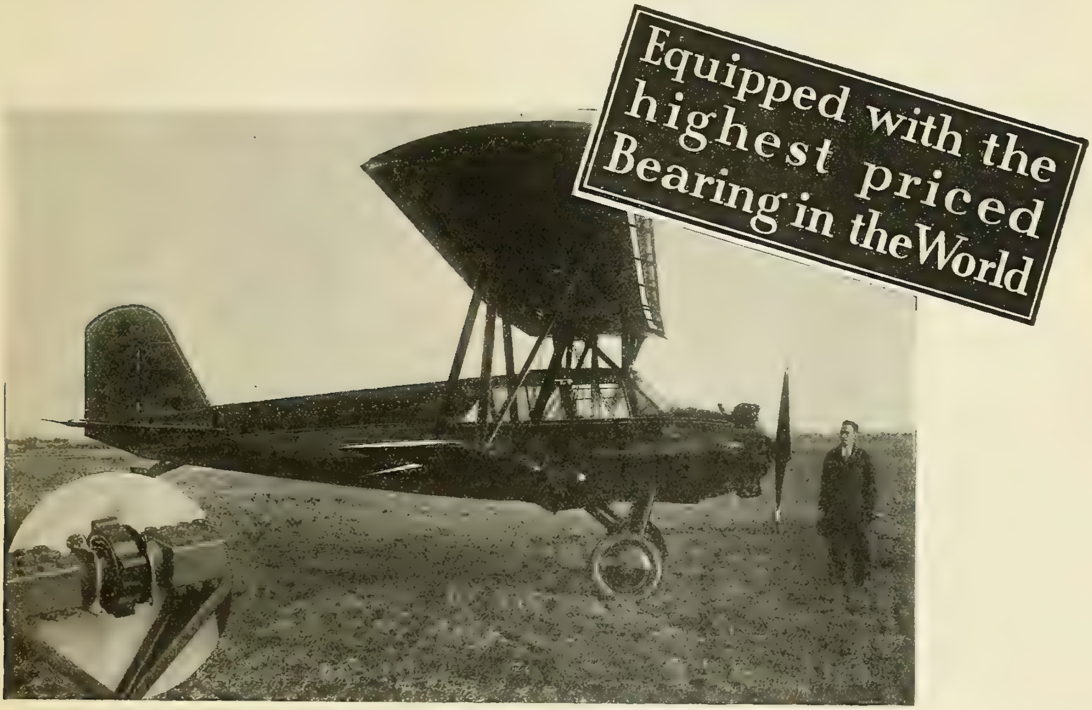
THE president of the German Aviation Union in a recent statement said that the membership of the union had increased from 12,000 to 40,000 within the last two and one-half years. Clubs belonging to the union are to be found in almost every German town. Many of these clubs possess their own motor planes and practically all of them have gliders and sailplanes. Ballooning, model flying and training of young pilots are carried on by these groups.

THE Phoenix Flugzeugbau of Germany, manufacturer of the Phoenix-Meteor light planes, recently announced plans for

(*Continued on next page*)

ANOTHER MANUFACTURER IN THE AVIATION INDUSTRY THAT USES SKF BEARINGS

CURTISS AEROPLANE & MOTOR COMPANY, INC.



ON THE CURTISS TANAGER PRIZE WINNER 92 SKF BEARINGS MADE GOOD

ON the Curtiss Tanager, winner of the $100,000 prize in the Guggenheim Safe Aircraft Competition, ninety-six SKF Ball Bearings are used. This was the only entry to pass the eighteen qualifying tests therefore making it unnecessary to hold the final competitive tests. SKF takes pride in the part its products played in meeting the extremely severe stipulations of the qualifying conditions.

Mr. Robert R. Osborn, the design engineer, says, "Four SKF Self-Aligning Ball Bearings were on the new Curtiss ailerons, one of the outstanding features of the ship. Ninety-two SKF Bearings were used in the automatic slot installation. Before using these bearings to carry the automatic slot loads they were tested under a load of 1200 pounds . . . and rolled easily with no damage to the balls or races."

SKF INDUSTRIES, INC., 40 East 34th Street, New York, N. Y.

2458

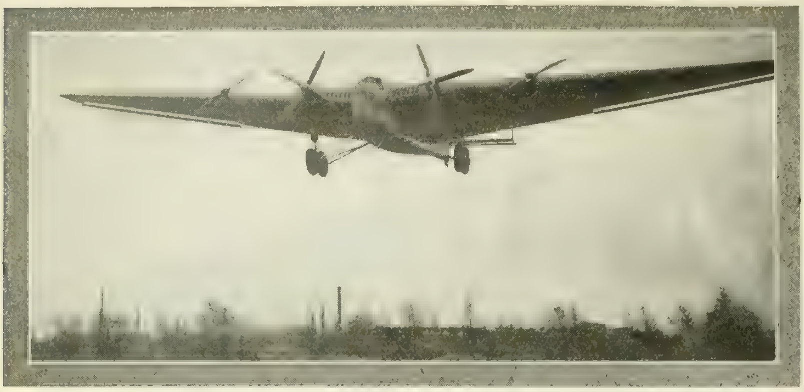
EQUIPPED WITH THE HIGHEST PRICED BEARING IN THE WORLD

Means just this

SKF

Ball and Roller Bearings

That the manufacturers whose product is illustrated above preferred to pay more for their bearings and less for servicing or replacing them. They preferred to pay a higher price in the beginning than many times this higher price in the end. And, finally, they preferred to economize by using SKF bearings because they are made to do their job, not to fit a price list.



Junkers G-38 four engined monoplane coming in for a landing after a trial flight

(*Continued from preceding page*)

the manufacture of its products in the United States. The Phoenix-Meteor plane, powered with an A. B. C. Scorpion engine, was described in the October, 1929, issue of Aero Digest.

HOLLAND

THE K.L.M., Royal Dutch Air Lines, recently issued a report which included a comparison of the activities of the company in 1920 with those in the first nine months of 1929. The number of miles flown by planes of the company in 1920 was 50,840, according to the report, as compared with 1,019,776 miles flown during the first nine months of 1929. The number of passengers carried in 1920 was 345, as compared with over 18,000 in 1929 up to October 1. The company carried 48,400 pounds of cargo in 1920, as compared with 154,000 during the period covered in the report for 1929.

The expansion program of the company which has been effected since the inauguration of its service includes the establishment of regular air transport service to Paris, Copenhagen, Hamburg, Basle, London, and between the Netherlands and the Netherland East Indies. The expansion of the company has been facilitated by government subsidy which was in May, 1929, increased by 2,500,000 florins to assist in the establishment of the line to the Indies. The company has also been authorized by the government to issue bonds for a further amount of 2,500,000 florins, the payment of interest and redemption of the securities being guaranteed by the government. The bond issue, according to the agreement, will be issued at such time as may be agreed upon by the state.

A NEW record of one hour and forty minutes on the Paris-Holland route of the Royal Dutch Air Lines, Holland, was recently established by Jan Kress, pilot of the company. He flew the distance of 279 miles which the route covers at an average speed of 167 miles per hour.

RUSSIA

A TOUR of the United States for the purpose of studying the American aviation industry, especially commercial airline operations, has been undertaken by P. I. Baranov, chairman of the Soviet Council of Civil Aviation, A. N. Tupolev, builder of the plane, *Land of the Soviets,* which recently flew from Moscow to New York, and engineers of the civil aviation council of the U. S. S. R.

Present plans of the Soviet government call for 30,000 miles of airlines to be in operation by 1933, in addition to expansion of aerial photography activities and insecticide dusting services. Included in the principle airlines scheduled to commence operation in the spring of 1930 are those connecting Moscow and Tashkent in Central Asia; Khabarovsk and Sakhalin Island, and Kharkox and Odessa. The present Moscow-Irkutsik line will increase operations, according to present plans, and preparations will be made for the extension of the line from Irkutsk to the Pacific Coast.

JAPAN

AN all-metal twin-engined flying boat has been constructed for the Japanese Department of Communications by the Aircraft Section of the Kawasaki Dockyard Company. The plane will be used for trial flights on the proposed airline between Fukuoka and Shanghai. The ship has a wing span of 72 feet, overall length of 58 feet and a height of 15 feet. It is powered with two B. M. W. engines of 600 horsepower mounted in tandem over the fuselage and wing.

CANADA

THE Moose Jaw Airport at Moose Jaw, Saskatchewan, is one of the best natural flying fields in Western Canada. The soil of the field is black loam with a gravel subsoil and is consequently free from flooding which occurs on many fields after heavy rains. The field has natural drainage, and is level virgin prairie land. Large and heavily loaded planes experience no difficulty in taking off the field at all seasons of the year. Moose Jaw is an important point on the Western air mail routes, and is situated midway between Winnipeg and Calgary, the distance to either point being 390 miles; it also affords a short direct air route to Saskatoon.

The Moose Jaw field is over half a mile square and is entirely free of obstructions of any kind. The prevailing wind is from the northwest, and the district about the field is free from valleys and hills. To facilitate night flying the field has recently been equipped with beacons and floodlights in accordance with the standard requirements laid down by the Air Service Branch of the Federal Government at an expense in excess of $20,000.

The Moose Jaw Flying Field is 2,400 feet square, and is situated 2 miles northwest from the town's postoffice on a highway. The hangar, built jointly by the city of Moose Jaw and the Moose Jaw Flying Club, is of a size sufficient to take care of visiting aircraft. Part of the building is heated, and there is a fully equipped, up-to-date work shop in connection. There is a large filling station adjacent to the hangar. Moose Jaw is a federally licensed Customs Air Harbor.

COMMENCEMENT of air mail service between Winnipeg and Calgary, and Regina and Edmonton, scheduled for December, has been postponed until the first week of February, according to an announcement of the Post Office Department of Canada. The postponement was necessitated by difficulties in the completion of lighting facilities on the routes.

The air mail service scheduled between Winnipeg and Calgary will travel by way of Regina, Moose Jaw and Medicine Hat; and that between Regina and Edmonton by way of Saskatoon and North Battleford.

COMMERCIAL AIRWAYS, LIMITED, recently inagurated a new mail and express airline over an 1,800-mile route from Fort McMurray, Alberta, Canada, to Aklavik on the Arctic Ocean, following the course of the Mackenzie River. It is one of the most northerly airlines in the world. The line is over a water route for practically the entire distance, and the planes operated are equipped with skis during the winter for take-offs and landings and will be equipped with pontoons during the summer. The company operates six-place Bellanca monoplanes powered with Wright Whirlwind 300 engines, manufactured by the Bellanca Aircraft Corporation of New Castle, Delaware. Two planes are operated regularly and a third is maintained at Fort McMurray for emergency purpose.

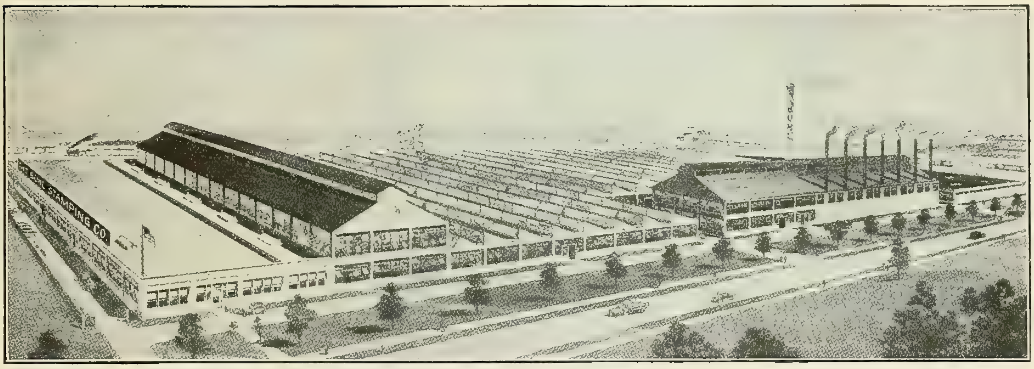
The route has been arranged so as to provide service at as many points as possible in the territory and stops are made at intermediate fields en route between Fort McMurray and Aklavik. Included among these stops are Fort Chipewyan, Fort Simpson, Fort Ridgely, Fort Norman, Good Hope, Arctic Red River, and Fort MacPherson. Headquarters have been established at Fort McMurray and Aklavik and representatives of the company are stationed at bases established along the route. Caches of gasoline and oil have been placed along the line of flight, and the gasoline capacity at each point is never permitted to drop below 1,200 gallons. Each plane operated by the com-

(*Continued on next page*)

THE BUHL NAME has been identified with progressive industry since 1833. Buhl products today carry far more than the name alone — they preserve the priceless heritage of almost a century of manufacturing leadership and integrity.

* * *

PROGRESS is made of many contributing influences. Those who lead today—and will lead tomorrow—in the production of aircraft and aircraft engines fortify their positions by delegating responsibility to sources of supply that have proven their worthiness of assuming it. The Buhl Stamping Company is in a uniquely strategic position to cooperate with progressive manufacturers. Its forty years of experience in the making of fine metal stampings is amplified by a complete, modern unit devoted exclusively to the design and production of aircraft parts.


THE BUHL STAMPING CO.

BUHL STAMPING COMPANY
Detroit - - - Michigan

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UNDER THE SAME DIRECTION:
The Buhl Building - - Detroit
Buhl Aircraft Company - Marysville
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(Canadian News continued)

pany carries emergency equipment consisting of blankets, rifles, provisions, and a small gasoline stove.

Included among the flying personnel of Commercial Airways, Ltd. are C. Becker, pilot and operations manager; Morris Burridge, Idras Glyn-Roberts, A. McMullen and Capt. W. R. May.

MEXICO

[M. HURST]

THE Cia. Mexicana de Aviacion has installed a second radio sending and receiving set at the field in Tampico, Mexico. This addition will enable the company to use one of the sets exclusively for plane communications and the other for business and general messages. Radio operators Ignacio Duarte Otero and Benjamin Bernal are on duty at the field. Radio sets have been installed at most of the fields of the Cia. Mexicana de Aviacion in Mexico, thus enabling the organization's headquarters to be in touch constantly with its various fields.

Within a short time the erection of an office and waiting room building and hangars will be started at the company's new base at Tampico. The work has been held up until grass had set on the new runways and until the final plans for the improvements could be drawn and approved. Work on the Brownsville field of the company is almost completed. The hangars are done, grading and draining of the new field has been finished and two new runways have been built. A third landing field will probably be built later in Brownsville.

A NEW airport, which ranks with the finest fields in the republic, has been completed at Guaymas, Mexico. The landing field comprises 116 acres, being almost one-half mile each way. It is completely illuminated for night landing, and has a Sperry reflector installed on the top of a neighboring hill. The apparatus is twenty-four inches in diameter, is rated at three million candlepower, and throws a stream of light that can be seen fifty miles away under ordinary atmospheric conditions. Another Sperry reflector, twelve inches in diameter and designed to pierce fogs and clouds, has been installed. Five clusters of floodlights, situated at each corner of the field, give ample light for planes to land at night. The hangars constructed at the airport each measure one hundred by eighty feet in plan. The airport is one and one-quarter miles from the city.

CONCESSION to operate a short-line airplane service in the Tampico section of Mexico has been granted to W. L. Mallory by the Cia. Mexicana de Aviacion, now a part of the Pan American Airways system. Terms of the agreement between Mallory and the Pan American subsidiary provide that the new aviation company will take over the Moralillo field in Tampico and all of the hangars, shops and other facilities in use at the airport. Both companies will use the Moralillo field and existing facilities until the Cia. Mexicana de Aviacion can move to its new airport north of Tampico on the Altamira road.

THE Federal Government of Mexico will spend four million pesos (approximately $1,920,000) during 1930 for airplanes and engines to be used by the Mexican army air service, according to a recent official announcement.

LINKING Mexico City with the Pacific coast seaport town of Acapulco for the first time by both land and air, the Pickwick Company of Los Angeles has inaugurated an auto stage line and an air mail, express and passenger service between the two cities. The motor stage line will be operated under the name of Pickwick International Stages, which a few months ago established a regular bus line from Laredo, south to Monterrey and Victoria. Pickwick is operating a tri-weekly air mail, express and passenger branch line from Mexico City to Acapulco by way of Puebla.

Arturo Aguirre, Director-General of Aviation in Guatemala

CONSTRUCTION of a steel hangar and installation of lighting equipment have been completed at the Los Mochis Airport, Los Mochis, Sinaloa, Mexico. The hangar has been designed to accommodate eight planes and is electrically lighted. Lighting equipment includes a beacon light installed at an elevation of five hundred feet with a maximum visibility of ninety miles, two sets of floodlights and boundary and obstruction lights. Underground gasoline tanks with electrically driven pumps have been installed, and the construction of two oiled and intersecting runways has been completed, one 6,000 feet long and the other 3,500 feet in length.

Los Mochis Airport is the over-night stopping place of planes of the Pickwick Latin American Lines en route from Los Angeles, Calif., to Mexico City.

COL. ROBERTO FIERRO of the Mexican Air Force will start about March 1 on a 10,000-mile flight from Mexico City to Washington, D. C., New York, Havana, South America, and over the South Atlantic to Paris and London, according to plans recently announced. On the flight Col. Fierro will use a Lockheed Sirius low-wing monoplane powered with a Pratt and Whitney Wasp engine of 425-horsepower, manufactured by the Lockheed Aircraft Company of Burbank, Calif. The plane will be equipped with two open cockpits and dual controls, and is to be the second Lockheed Sirius plane manufactured by the company, being a duplicate of the first which was recently purchased by Col. Charles A. Lindbergh. Construction of Col. Fierro's plane will be completed in February.

Col. Fierro is commandant of Balbuena Field, Mexico City. During the recent Mexican revolution, he was in command of the air force sent by the federal government against the rebels. He graduated from the Mexican School of Aviation at Mexico City in 1922. One of his first flights was a 1,200-mile journey from San Diego and Mexicali to Mexico City, which he covered in twelve hours in an experimental plane. He later made a good-will flight to Central America and along the northern areas of South America.

PLANES of the Corporation Aeronautics de Transportes S.A. covered a total of 97,557 miles on mail and passenger service throughout the Republic of Mexico during 1929, according to a recent announcement of C.A.T. officials. The volume of mail carried in December, 1929, was reported twenty-seven per cent greater than that carried in November. The number of passengers carried during December increased thirty per cent over the number carried by planes of the company in November.

Developments at the Mexico City Municipal Airport

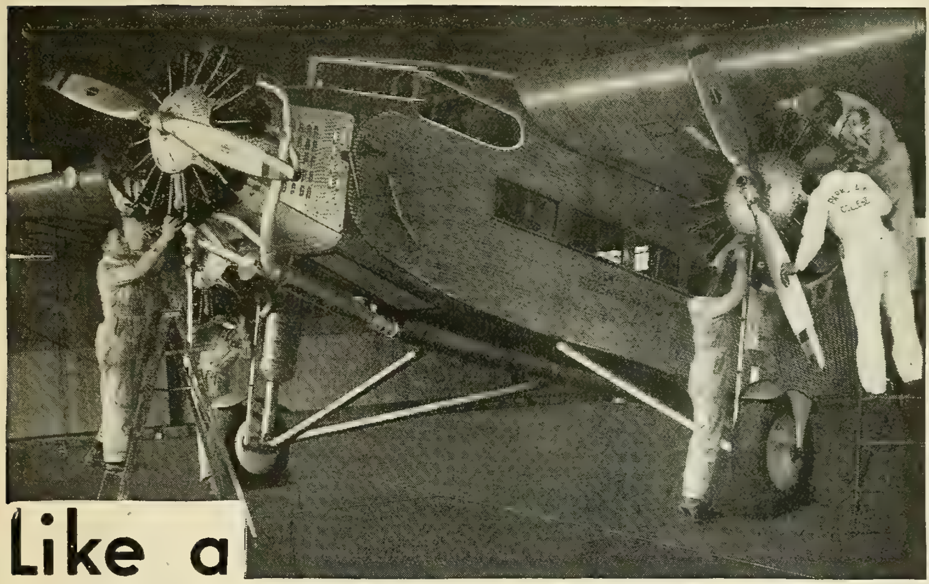
THE new civil airport at Mexico City will be the largest and best equipped air-field in Latin-America, according to the plans drawn up by Mexican officials. Work is fast progressing on the airport and it is expected that it will be ready for use in March and complete by the first of June.

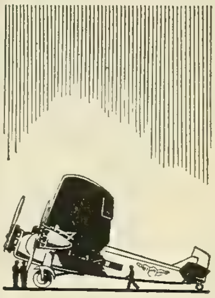
Work began on the 230-acre site in October, 1929. Three runways, 132 by 4,000 feet, two of which are hard-surfaced, the third grass-covered, have been completed and a drainage system has been installed.

A large hotel-station is approaching completion at the Mexico City municipal airport. Containing waiting rooms, rest rooms, a dining room, writing room, and offices on the first floor, and thirty bedrooms with baths upstairs, this beautifully designed building will take the shape of a great airplane when viewed from the air. A canopy, stretched from the front of the edifice across the taxi runway to the operations office, will suggest the fuselage of this plane. The all-steel hangar that has been erected is the first Mexican-produced hangar to be constructed. It is standard size, 120 by 20 feet, and comes from the steel foundry at Monterrey.

Due to the non-absorbing terrain of the

(Continued on next page)



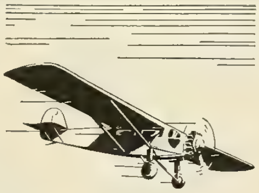


The illustration at the left shows a group of students in Parks Airplane and Engine Mechanics School receiving instructions on the new tri-motored Ford monoplane which has recently been added to the Parks fleet of more than 30 planes of varying size and type.

Like a University Degree

A DIPLOMA from the Airplane and Engine Mechanics School of Parks Air College brings you immediate returns. It is proof positive of your ability. For the aeronautical industry knows *by gratifying experience* that Parks-trained mechanics are experts—thoroughly competent to handle any job in the factory or on the flying line. The Parks course for mechanics is unequalled anywhere in the world, just as Parks flying courses are without a peer. Every subject is taught systematically—*thoroughly* — conscientiously. Every operation, from the fabrication of metal fittings to the building of wings and fuselages and the assembly of new airplanes, is performed under the supervision of instructors such as only a great institution like Parks can obtain—and with the *finest and most elaborate machinery money can buy.*

Every Parks course, too, is under the close personal supervision of Oliver L. Parks, whose fame as unquestioned leader in the field of aviation instruction is international. That is another reason why *Parks* training means *best* training—why a diploma from Parks gives the same definite prestige to its holder as a university degree.



Parks Air College was one of the first to be licensed by the U. S. Department of Commerce as a fully accredited transport school.

In its affiliations, too, Parks Air College offers its graduates more opportunity for employment than any other training school in America. As a division of the Detroit Aircraft Corporation it is a member of an organization that includes five of the finest aircraft factories in America. They are manned—and will continue to be manned—by Parks mechanics! Another assurance of the future of the Parks-trained man!

You, too, can be a Parks graduate. You, too, can know the success that comes with the *finest training in the world.* The coupon on this page will bring to you the fullest information about Parks and its courses.

Get it in the mail RIGHT NOW—and we shall send you "The Man Who Tunes the Plane", a vivid, interesting picture of the mechanic's highly profitable place in aviation.

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American military planes in the air services of Pan-American nations: left, a Keystone bomber; right, six Vought Corsairs

(Mexican News continued)

field, both structures are built on floating foundations. Due to this condition also the perforated pipe draining system, common throughout Europe, was used. Pipes perforated with holes of about an inch diameter are laid two feet under a pebble surface. This allows seepage to take place through the stones and complete drainage to be effected by the pipes.

ARGENTINA

THE operation of a regular passenger, mail and freight air transportation service between Buenos Aires, Bahia Blanca and Comodoro Rivadavia has been inaugurated by the Aeroposta Argentine, airline operator of Argentina, which uses two planes on the route. According to the schedule a plane leaves Buenos Aires every Tuesday and Friday at 7:30 a. m., stopping en route at San Antonio Oeste and Trelew and arriving at Comodoro Rivadavia approximately seven hours later. Return planes leave Comodoro Rivadavia every Sunday and Tuesday at 4:30 a. m.

THE Argentine government has appropriated the sum of 450,000 pesos, paper, ($189,000), to the Department of War for the renewal of operation of the airplane factory at Cordoba, Argentina.

LONG-WAVE RADIO RECEIVERS

(*Continued from page 61*)

minimum by placing the receiver and antenna as far back from the engine as possible; and third, that by placing the apparatus in the after-part of the fuselage it is simpler to install and does not take up space which might otherwise be used for payload. On very small planes the extra weight behind may tend to make the ship tail heavy, but usually this is not the case.

The remote tuning controls on almost all of the receivers now obtainable are about the same. There is a tuning dial, usually operated with a crank or knurled knob which actuates the receiver through a flexible cable, similar to a tachometer cable. The volume control, on-and-off switch, and jack for the headphones are mounted on a small box or plate and connected to the receiver by a cable of bunched wires, covered with a metal sheath. In the case of the Fokker F-32 it was found possible to use almost fifty feet of cable between the cockpit and the receivers without any perceptible backlash in the tuning controls.

Most manufacturers have incorporated some definite source of power supply for their receivers. In the majority of cases the twelve-volt battery on the plane is used to light the filaments of the tubes while 180 volts of dry batteries are required for the "B" supply. One manufacturer, however, has incorporated a small dynamotor which runs on twelve volts and supplies 200 volts for the plates of the tubes. It is claimed that this method of power supply is more reliable and economical than batteries, and weighs less. As an alternative method for planes which do not have a storage battery, the same manufacturer has a small wind-driven generator which supplies both filament and plate voltage. Frank Hawks used such an arrangement on his last non-stop flight across the country. He is now an enthusiastic booster for aircraft radio, and claims that he would not have been able to complete the trip without the regular broadcasts from the airways stations.

The actual installation of a receiver in any particular airplane requires a certain amount of ingenuity. There is nothing particularly difficult about it, and any first-class mechanic should be able to do the job with the help of the instructions given by the manufacturer of the apparatus.

In open cockpit jobs it is usually best to cut a small hatch, either in the top or the side, just behind the rear cockpit. A shelf should then be firmly anchored to the fuselage upon which the apparatus can be mounted. On cabin planes there is usually a door or hatch opening from the passenger compartment into the rear section of the fuselage, and a shelf can be easily placed to accommodate the receiver.

The tuning and volume controls should then be run up to the cockpit, and placed within easy reach of the pilot. In most instances it is better to place these controls on the left hand side of the seat, just below or behind the throttle. The pilot can then continue to guide the ship without having to take his right hand off the "stick." It is not advisable to have the controls on the instrument board because in many cases they would be out of easy reach, and tend to interfere with the navigation instruments.

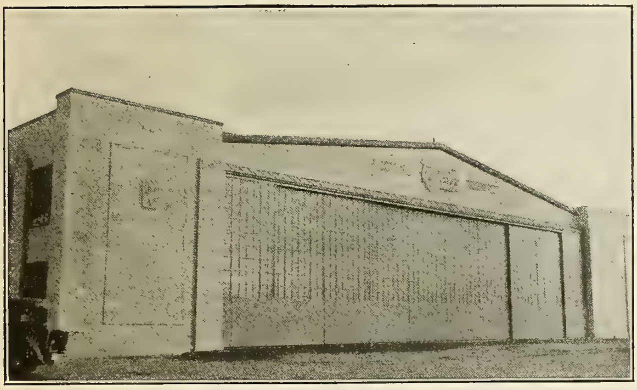
The best type of receiving antenna is a vertical mast about five or six feet high. There is a very important reason for this. A vertical antenna will receive signals equally well from all directions, while a horizontal wire (for instance, from a wing-tip to the fuselage) will often have a marked directional effect. This phenomenon is not serious when voice broadcasts alone are to be received, but in cases where the radio beam is to be used for navigation, very large errors in position have been noted with the horizontal arrangement. The connection from the base of the mast to the receiver should be short, and if possible, the antenna should be directly over the set.

Two types of masts are generally in use. One is of streamlined dural tubing, having a cross section about one and one-half inches wide and three inches long. The other is made of spruce, split length-wise, with a wire imbedded in it before the two halves are glued together. A properly designed wood mast has less tendency to vibrate in the air stream than a metal one, and also has the advantage that no insulation is necessary at the points where it is clamped to the fuselage.

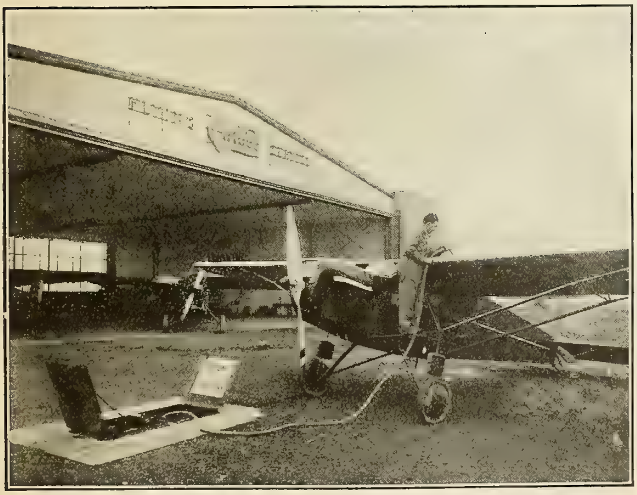
Many pilots (usually those who have never had a radio) have regarded the mast as an unsightly contraption, and something to be ashamed of. Lately, particularly among air mail pilots, however, the mast has come to be a mark of distinction. Not every one has a radio, and they want the world to know that they are playing safe. They are not only cutting down their own risks and protecting the reputations of the transport companies for which they work, but they are doing their best to protect the name of the industry as a whole.

Line-up of planes at East Boston Airport

CURTISS-WRIGHT FLYING SERVICE AT BOSTON



Recently constructed hangar of the Curtiss-Wright Flying Service at East Boston Airport.



Curtiss-Wright Flying Service mechanic fuels a plane with Socony.

has always used Socony

THE Curtiss-Wright Flying Service at Boston has flown its planes from East Boston Airport with Socony Aviation products since its entry into the New England field.

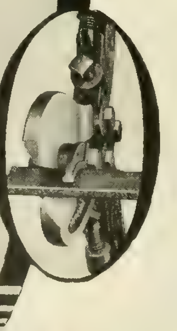
Operating 37 planes now, and increasing the number continually, this famous flying service has found Socony Aviation products highly satisfactory for its school of instruction and also for its air taxi service and scheduled passenger operations to Cape Cod and Nantucket.

Socony Aviation products are sold at nearly every large airport in New York and New England. Aviation pilots everywhere endorse these companion products.

SOCONY

Aviation Gasoline
Aircraft Oils

STANDARD OIL COMPANY OF NEW YORK



PORTER

PORTABLE HAND OPERATED CUTTING TOOLS

The Shear Cutter

This is the most recent adaptation of the Porter lever and toggle joint principle and is the first Porter tool having jaws operating on the shear principle with the cutting edges passing each other in the cutting operation.

It is made in three sizes, 14 in., 24 in. and 36 in. The 36 in. has a capacity of 5-8 in. soft wire rope or flat bars 1 1-2 in. x 9-32 in.

In cutting wire rope the Shear Cutter severs every strand and leaves no uncut or ragged edges. On flat stock the cut is clean and the edge of material is not unduly twisted or distorted. The Shear Cutter is rapidly gaining recognition as a valuable time saver in many industries as well as an emergency tool for airports. It has the cutting capacity of a bench or power tool plus portability. It is used extensively in wire rope plants and has been found to meet a long felt want in elevator and hoist installation work where wire cable is used. Telephone and power companies are using this tool with great satisfaction on guy wire and it promises to be one of the most popular models ever brought out by this company.

The Porter line of portable cutting tools includes Bolt Clippers, Chain Cutters, Nut Splitters, Shear Cutters, Wire Cutters, etc. in a number of sizes and models. Write for folder illustrating and describing the Porter line.

Sold by leading jobbers.

H. K. PORTER INC.
12 *Ashland Street*
EVERETT MASS.

THE NEXT TEN YEARS OF FLYING

(*Continued from page* 69)

together in or near our larger cities. People will live better, be healthier, be happier because of the airplane.

"Measured in hours of remoteness of communication, the length and breadth of the United States will shrink to half its present size. This will add immeasurably to the strength and security of the nation, by welding its people closer together and permitting them to think and act more nearly in unison on national problems. State boundaries and states' rights will lose much of the significance that has made them so often an issue. Natural barriers of mountains and water will become merely playgrounds for greater numbers to enjoy.

"But railroads and other forms of surface transportation will not be supplanted. Flying will find its place in a new need, as has the motor car.

"As to the machine itself, it may be that we will see a complete change in the method by which we fly—or we may see only a development of present design and method. Little that the present automobile does could have been done by the car of twenty or even ten years ago. Certainly, fly we will—by one means or another—with or without the approval of a generation born to surface travel. It will not be while flying is spectacular; for to be spectacular is usually dangerous. A whole nation of individuals will never be spectacular; nor need they be, for flying is rapidly becoming less and less a subject for folks to explaim over.

"In fact, within the next ten years your friends will ask you whether you're going by air or rail, as unconcernedly as your taxicab chauffeur asks if you want the pennsylvania or the Long Island side of the Pennsylvania Station."

Another official of the same company, Colonel Paul Henderson, who is vice president not only of N.A.T., but of Transcontinental Air Transport, Inc., as well, and the Assistant Postmaster General who organized the night-flying service of the air mail, confines his predictions to the coming year. Says he:

"The year 1930 promises much in aviation matters. First, it promises a period when the hysteria of rapid expansion will be replaced by the more deliberate ironing out of detail, and the general settling down of many things relating to aviation.

"It promises a period of intensive public education in the matter of the day-to-day use of aeronautical facilities.

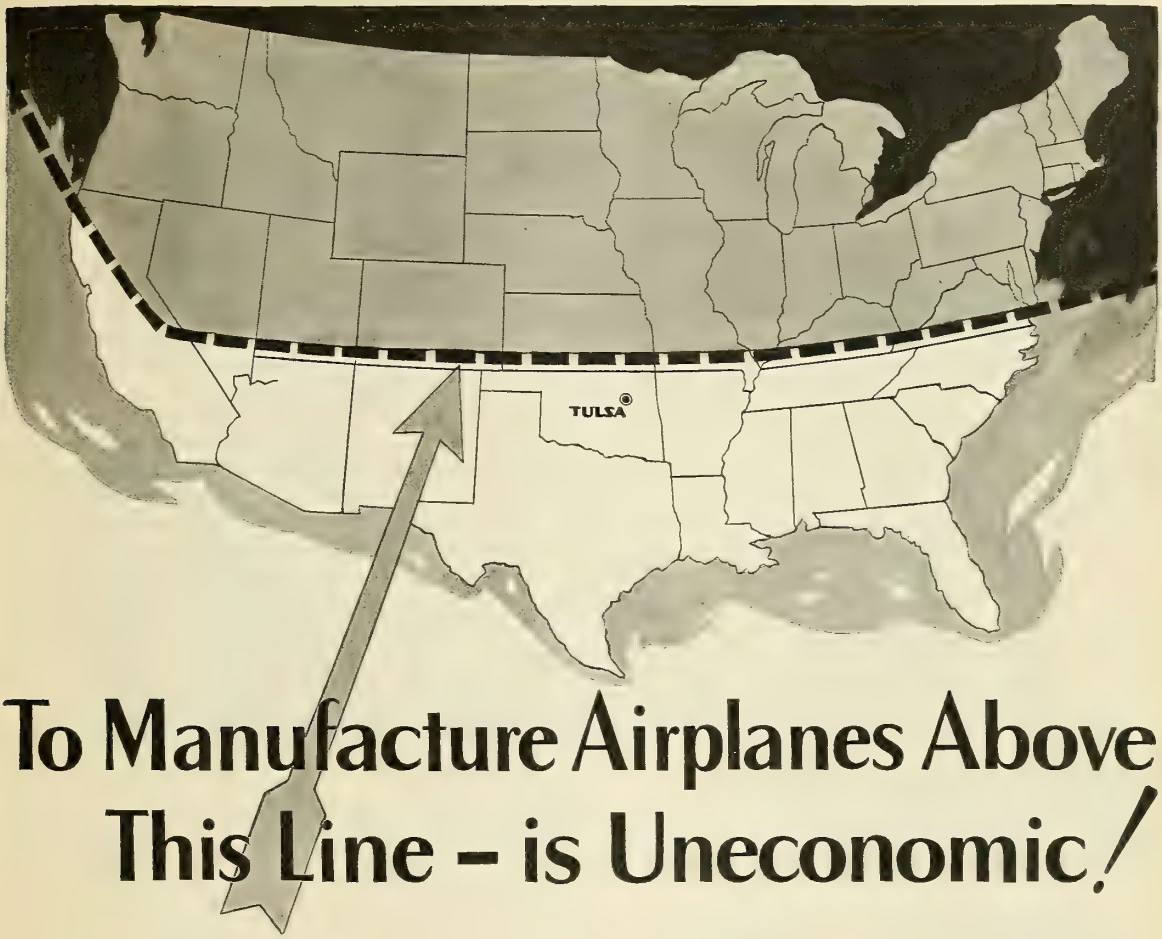
"It promises a period in which there will be a general clearing up of national thinking on the subject of commercial aeronautics.

"It promises a period during which certain expansions will be carefully and deliberately launched.

"The year 1930 will be an important milestone in aeronautical development. Each month of 1930 will require more careful thinking, more careful planning, and more careful 'moving forward' than has been required in recent periods.

"In aeronautical history, 1930 will probably be recorded as the year in which crystalizing and stabilizing influences are seen at their best."

In the March issue of AERO DIGEST, a second installment of Mr. Clary's article will be presented. Other eminent leaders in the aeronautical industry will express their conceptions of the future commercial air transportation. Because of their close connection with the industry and the importance of their activities in it, these leaders are in a position to furnish as accurate a guide of what we may expect in the years to come as is possible at the present time



To Manufacture Airplanes Above This Line – is Uneconomic!

Manufacturers in ALL lines are looking with wistful eyes toward the South—and many are actually *moving* south. There are economic reasons. But the airplane manufacturer, above all others, has fundamental reasons for selecting a southern site.

The most important reason is his need of year-round flying climate for test and demonstration flights. A second imperative reason is that only in the South will a stable year-round market prevail.

The airplane manufacturer should also give consideration to the *general* factors which are leading other lines of industry to move south—namely, lower housing, heating, lighting, ventilating costs for both factories and homes, due to mild climate—escape from the evils of congested industrial areas—more pleasant and healthful living conditions

Several convincing facts point to Tulsa as the coming airplane manufacturing center of the nation. First, Tulsa lies at the crossroads of East-West and North-South air travel. An airline map quickly substantiates this statement, and the fact that the Tulsa Municipal Airport handles more paid-for commercial air travel each week than any other American airport is further proof.

Other factors are that the oil industry is the largest single user of airplanes and that Tulsa is the world's oil capital—that Oklahoma is one of the wealthiest areas per capita in the world, and offers the combination most certain to result in rapid development of aviation, namely wealth, distances, and climate—and finally, that Oklahoma is today leading the South in business and industrial development.

Tulsa has two modern airplane factories and room for many more. Of her four fine aviation schools, two carry U S. Transport Rating, making Tulsa the only city in the country with two such schools. Send for our new Industrial Survey of Tulsa, and make full use of the data-gathering facilities of our Industrial Department, which is here to serve you.

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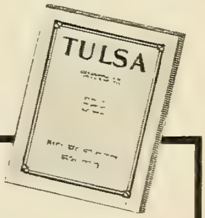

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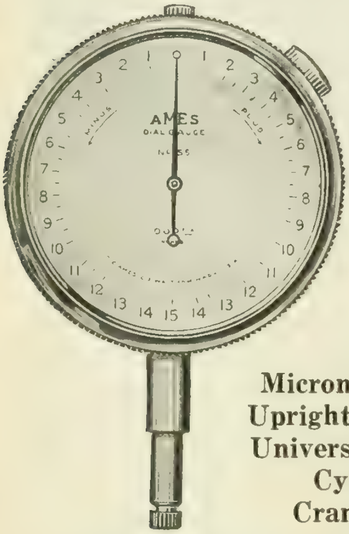

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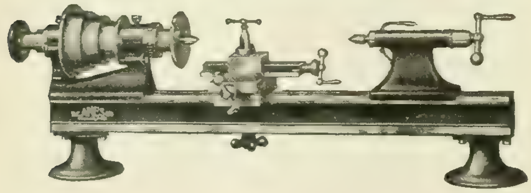

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ALMA MATER TRIES HER WINGS

(*Continued from page 67*)

clubs can find their way through the first hard months by avoiding pitfalls pointed out by older groups, that the veteran clubs can get new ideas from their brother organizations.

In addition, the college association recently affiliated itself with the National Aeronautic Association, which has a private flying club plan. Each club participates in all of the features of the N. A. A. plan, a most important one being the insurance plan for private flying clubs worked out by the National Aeronautic Association.

Insurance is very important for a flying club. If a society loses its ship through an accident and is without funds to pay for a new one, the result is likely to be disbandment of the club. The plan is an arrangement with a firm of aviation underwriters to write for each club a policy covering all risks, whether of crashes, destruction by fire, lightning, explosion, storm or tornado, or loss by theft. It includes also public liability up to the limit of $20,000 for a claim of any one person and a total of $40,000 for any one accident.

The policy also insures against damages to property of others, and includes passenger liability, provided no passengers are carried for hire. In case a club's plane is destroyed and a new one purchased, the policy will continue in force on the new plane without additional payment of premium. The cost of this policy is about $125 a member for a club of ten, and slightly less per member for larger clubs, on a plane retailing at $5,000.

Important as it is, though, insurance really is a secondary problem—for it does not have to be considered until a plane has been secured. College men, with some notable exceptions, have only moderate means, and a group of twenty or thirty has some difficulty in getting together $4,000 or $5,000.

Some of the light plane manufacturers have indicated that they might be willing to provide planes for college clubs under certain conditions. If any such arrangement can be worked out, it will solve the equipment problem.

An encouragement to the flying clubs was offered last year by Grover Loening, airplane designer, in the form of a cash award of $2,500 to be distributed among the three flying clubs that are credited with the most flying hours between December 1, 1928, and December 1, 1929. As this is written, the period has already elapsed, but announcement of the winner has not yet been made; it appears certain, however, that the award has been clinched by Yale, Harvard and New York University.

THE DUTCH RISE TO THE OCCASION

(*Continued from page 79*)

and the Royal Air Society asked the government to lend its support. The K.L.M. offered its services and an accord was finally reached between the supporters of the project and the government so that the establishment of this service has become a fact. A new operating company, which is an off-shoot of the K.L.M., and which works closely with it, has been formed for the exploitation of this development and is known as the Nederlandsch Indische Luchtvaart Maatschappij. Its fleet is composed of four trimotor

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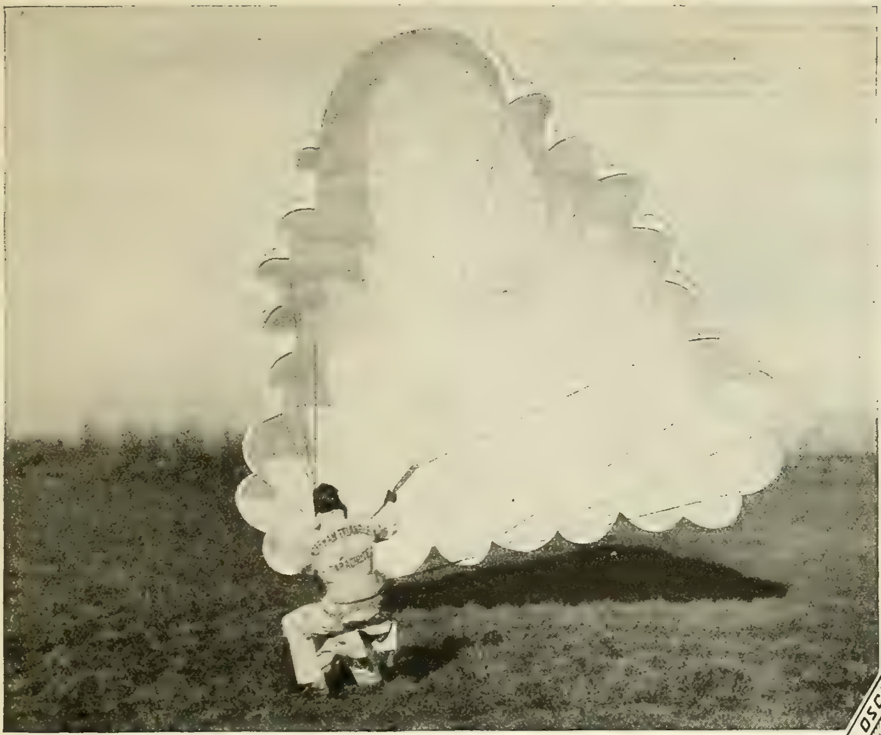

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FAR SUPERIOR . . .

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Three years ago, E. L. Hoffman received from the hands of President Coolidge the magnificent Collier Trophy as the award for having contributed the greatest achievement in aviation during 1926. That achievement was the parachute.

Instead of resting on his laurels, Hoffman immediately began the work of improving, changing and perfecting his ideas . . . utilizing every scientific help the nation could supply . . . and today announces a new parachute, vastly superior to any others.

Its advantages are so great and so numerous that we can only itemize them. The details will be sent on request.

A parachute is unlike any other commodity, for it is worthless if not 100% efficient. If it fails, someone dies. Can you think of anything else which demands such a fearful price for failure?

Price has nothing to do with safety. When you are getting a parachute—it is engineering, experience, care and honesty which makes it possible for you to continue to live when you put it into use.

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1. EXCEEDINGLY LOW SHOCK ON OPENING. Dynamometer tests show less than half the shock experienced in most other 'chutes.
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(*Continued from preceding page*)

Fokker VII-A monoplanes, each powered by three Armstrong Siddeley Lynx engines. Normally this type of Fokker is able to carry ten passengers when fueled for about six hours flight. I have heard that the Dutch government has appropriated a sum of approximately $1,000,000 to augment the capital of the new operating company.

Fokker planes which are used exclusively on all of the Dutch airlines hardly need any introduction. They are as well-known to Americans as they are to Europeans, but there are certain types produced in Europe which are relatively unknown in America and which therefore may be briefly described in this article.

When the Treaty of Versailles prohibited the construction of aircraft in Germany, Anthony Fokker, who had built such successful military planes for that country during the war, returned to his own country in 1919. His international reputation as an aeronautical engineer helped him to establish an aircraft plant at Amsterdam, which is known as the N.V. Nederlandsche Vliegtuigenfabriek and which has become the most important aircraft factory in the nation. Many types of military and commercial planes have been produced there. In 1921, a branch of the Amsterdam plant was established in New Jersey in the United States, and in 1924, this plant became independent of the parent organization by the creation of an American company known as the Atlantic Aircraft Corporation. Mr. Fokker from then on has been dividing his time between America and Holland, though his greatest interests are at present on the American side of the Atlantic. As everyone knows, another plant was recently built in Wheeling, West Virginia, and the company is now known as the Fokker Aircraft Corporation and has since been acquired by General Motors.

The Amsterdam plant has supplied planes of various types to twenty-one nations, and last year eight nations owned the licenses to build his prototypes and England, France and Belgium have since acquired similar privileges. In Holland the welding of joints on the hollow steel frameworks is permitted, though some European governments do not grant flying permits to planes so constructed, so that the Dutch build their fuselages both ways. Since there are no airplane engines produced in the country, all of the planes are equipped with foreign engines, principally of English, French and German make.

One of the best known types of commercial Fokker planes used in Europe is the Fokker VII-A which is an eight-passenger cabin monoplane, usually powered with a French Gnome-Rhone Jupiter air-cooled engine. There is also another version of this type built to larger specifications which is able to carry ten passengers and which is generally powered by three Gnome-Rhone Titan engines or three Armstrong Siddeley Lynx engines. The Fokker Universal was introduced to Europe last year. The Fokker F-VIII, which is one of the most widely used on European airways at present, is built to accommodate fifteen passengers. It is a bi-motor monoplane powered by two Gnome-Rhone Jupiters, having a span of 75.4 feet and a length of 52.4 feet. Its useful load amounts to 2,491 pounds. The fuel tanks, which are in the wing have a combined capacity of 264 gallons giving the

(*Continued on next page*)

All the Up-to-Date Facts of Aviation For Quick Reference

1929 — a year of bewildering progress! Nearly 200% increase in licensed flyers. Over 250% increase in student applications. Flying schools nearly doubled in numbers. Domestic air mail doubled. Scheduled operations increased from 27,000 to 100,000 miles daily. 166 approved type certificates for aircraft, 19 for engines, 28 for propellers. 90,000,000 people in territory served by airlines for freight, mail, and passengers. And 1930 promises to break all records again. Are you accurately posted on all the important developments in the field? You can have all the facts at your finger tips in

The Official Review of Aviation Progress

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for 1930

Prepared by The Aeronautical Chamber of Commerce of America, Inc.

Each year for the past eleven years the Aeronautical Chamber of Commerce, in cooperation with officials of the Government service, has prepared a summary of aviation progress that has come to be an indispensable reference tool for every man engaged in the science and business of aeronautics. The twelfth annual edition, now coming from the press, contains more valuable data than ever before, reflecting the tremendous advances that aviation has made within the year. It offers to the technician, the flying man, the airline official, and the manufacturer equally important information on every phase of activity. It brings within your arm's reach a vivid panorama of the entire current world of flying.

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containing a vast amount of data on schedules, routes, races, aircraft engines, legislation, instruction, etc., etc.

AVIATION NEEDS TRAINED MEN

Colonel Lindbergh says:

"There are many phases of aviation in addition to actual flying." . . . "Flying proper will be but a secondary consideration in a comparatively short time." . . . "Planes built along the lines of those being tested in the Daniel Guggenheim Contest soon will be as easy to fly as a motorboat is to run."

—N. Y. Herald Tribune, Nov. 27th.

We agree with Colonel Lindbergh! It takes about seventy men on the ground to keep one pilot in the air but everyone of these men must be a trained man.

A short course at the Institution of Aeronautics, Inc., in Drafting, Designing, Engineering, Engine and Airplane Mechanics, Wood or Steel Working, Painting, Maintenance, Radio, Welding, Executive and Office Work, will start you on your way to independence.

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A. D. 2-30

(*Continued from preceding page*)

plane a range of six hours or 478 miles at a cruising speed of 112 miles per hour. The two oil tanks have a capacity of 74 quarts each.

For military service the Fokker plant produces several excellent models in the CV series. These fast biplanes are built both for reconnaissance and combat work, and for this reason two airfoils have been designed, either of which can be used on the same fuselage which is generally powered with a 450-horsepower Hispano engine or a Lorraine engine of equivalent power. True to the Fokker construction, the wings are entirely of wood, having a plywood covering. The Fokker CV with the E wing for reconnaissance work has a total surface of 423 square feet and a speed of 156 miles an hour; with the D wing, the area of which amounts to 310 square feet, this plane has a speed of 160 miles an hour, though carrying less weight. A number of European governments use these CV planes in their military services, and some time ago Captain Botved of the Danish Flying Corps achieved a notable flight in a CV-E, the reconnaissance plane, when he flew from Copenhagen to Tokio and return. Fokker also builds a small biplane for training purposes which is powered with a 100-horsepower motor and known as the Fokker S-IV.

The Amsterdam plant has been producing two outstanding seaplanes designed for naval service. One of these is known as the Fokker T-IV, a large seaplane equipped with two metal floats and powered by two 450-horsepower Lorraine engines built into the thick wing on either side of the fuselage and directly over the floats. It is designed as a bombing plane but is able to carry torpedos beneath the fuselage and has a machine gun mounting in the nose. The T-IV is built in Holland for service in the Dutch East Indies.

The Fokker B-III is a flying boat with a metal hull and wings of wood construction. It is driven by a 450-horsepower Napier Lion engine which is mounted between the wings over the hull and acts as a pusher. The B-III has a maximum speed of 119 miles per hour and cruises at 96 miles per hour.

Aside from Fokker, there are several smaller aircraft factories in Holland. The Maatschappij voor Vliegtuigenbouw Avoilanda, whose plant forms part of a shipyard at Papendrecht, builds under license Dornier Wal flying boats, which are used for naval service in the East Indies. In Rotterdam, adjacent to the air-field, the genial Heer Koolhoven has his little plant in which he produces the light planes that bear his name. He is at present producing his three-place cabin monoplane known as the FK-41 and recently sold the building license for all countries except Holland to Desoutter, who will build these planes under that name in England. Another Dutch aircraft plant is the Maatschappij Tot Het Vervaardigeuvan Vliegtuigen, which builds a small sesquiplane, known as the Pander, in its plant in the Hague. It is rumored that Rohrbach of Germany may set up an aircraft factory at Rotterdam, though as far as I can learn this has not yet been decided upon.

The two principal commercial airports in Holland are those at Rotterdam and Amsterdam. The latter was described in the June issue of AERO DIGEST in an article by U. F. M. Dellaert. The Rotterdam field, known as Waalhaven, is located at a distance of four miles from the city and on very low ground, which is

(*Continued on next page*)

It takes off in 50 YARDS

. . . but that's only one *reason pilots in 16 countries call it the world's SAFEST light plane*

FIGURES show that take-off crashes account for 12% of all airplane accidents in this country.

That's why Avian engineers gave the Avian perfect take-off performance.

The designers cut its weight to only 875 pounds—including the 95 h.p., Cirrus air-cooled engine that holds more records than any other light plane motor in the sky lanes.

The Avian's cushiony, split-axle undercarriage insures smooth running over the bumpiest of ground. Its Handley-Page wing slots permit the pilot to pull its nose up sharply without danger of crashing from a stall.

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The wind that forces its way under the padding of ordinary goggles and gives the flier "crying eyes" cannot penetrate the sealed air-tight contact which this channel-shaped, pliable rubber mask creates. Only slight headband tension is required to give this sealed contact, and thus the wearer is relieved from discomfort and any tendency toward sinus trouble caused by undue pressure on sensitive parts of the face from excessive headband tension.

While flying, air is forced through the venturi tube (on top of each cup) which partially exhausts the cup interior and so eliminates lens fogging.

Each lens affords a lateral range of vision of 135° and their surfaces are ground with a precision that permits of no image distortion. This frees the flier from those headaches which usually come from eye-strain during prolonged periods of goggle wearing. These Goggles meet the rigid new U. S. Navy Specifications.

The workmanship, appearance, and performance of the Willson Pilot Goggle leave little to be desired.

PRICE
with clear glass $20.00 *per pair*
with tinted glass 23.00 *per pair*

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(*Continued from preceding page*)

characteristic of many of Holland's air-fields, some of which are actually below sea level. Besides these two civil airports, there are air-fields at scattered points in the Low Country. There is a naval station at Schellingwoude, near Amsterdam, another at De Mok on the Isle of Texel, another at De Kooy, near Helder, while the Flushing airport also serves as an air station for naval service. There are military fields at Soesterberg near Utrecht, Glize-Rijen and Oldebroek. In addition to these, there are landing fields at which no personnel or equipment is maintained at Rijssen, Wissekerke, Roosendaal, Deventer, Zierikzee and Bussum.

The Dutch government has placed the supervision of all flying in the hands of the Air Section of the Department of Public Works, which in the Netherlands is known as the Onder Afdeeling Luchtvaart van het Ministerie van Waterstaat. This department has control of air legislation, navigation agreements, subventions, air routes, airworthiness certificates, airways lighting, meteorological bureaux, radio stations and other such duties as enter into the government's control. The International Air Traffic Association, of which nearly all of the airlines in Europe are members, has its headquarters in Holland with offices at "twee Anna Paulowнplein" in the Hague.

This resumé of aviation in the Netherlands covers an interesting development in view of the size and population of that country. The civil airways and the small but important aircraft factories are developments which Dutchmen can view with a certain amount of justifiable pride. In short, one must admit that with the rapid development of aviation since the war, the Dutch have risen to the occasion.

AVIGATION IN COMMERCIAL AVIATION

(*Continued from page 74*)

which would be impracticable if celestial observations were involved, unless the avigator could be entirely divorced from duty as pilot.

In addition to the usual equipment such as compasses, air speed meters, turn indicators, etc., with which every well equipped plane is provided, the only appliances that would have to be purchased are a drift indicator, a course and distance indicator or other means of solving the wind-air speed vectors, and adequate maps.

Finally a word of solace to the pilot who is confronted with the necessity for mastering another science: avigation by dead reckoning and piloting methods is not difficult to learn; anyone having the mental faculties necessary to be a successful pilot need not be worried, for only the most complex and intricate methods of avigation have been exploited and the best and simplest methods more or less ignored.

NO MORE MONUMENTS

(*Continued from page 72*)

pick its pockets. This magazine said so, among others, and rubbed the lesson in with all available salt and pepper.

In spite of which the thing happened. In the fair name of aviation, the public was "took across" once again. In the fair name of aviation, the jugglers of high finance traded and bartered, using the industry as a new pawn in an old game. In the fair name of aviation, there were monumental mergers, giant consolidations and enough mahogany furniture to give Grand Rapids another good year. And all of a sudden there were more camp followers on

(*Continued on next page*)

DEPENDABLE SCREW PRODUCTS FOR AIRCRAFT CONSTRUCTION

Strength and safety in aeroplane construction depends largely upon the strength, accuracy and dependability of the component parts and the units that join them together.

Use Reed & Prince Screw Products. You can depend upon their unvarying accuracy and just one standard of quality—the highest. Every Reed & Prince Product meets the U. S. and S. A. E. Standards in strength, finish and dimensions.

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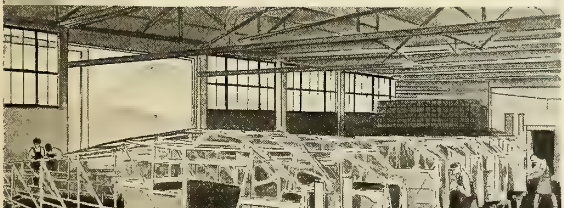

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AVIATION is waiting for no one! Landing fields, plane and equipment factories, air lines, service and sales organizations—all are leaping ahead in the most amazing development any industry has ever known. In such racing, feverish activity, *where* is there any room for a man who has nothing to offer? An empty pocketbook is no drawback—but Aviation has no place, no patience, no *time* for empty hands or empty heads! Aviation is taking-off for the greatest non-stop flight in history—and the men who will go along and climb to the top are the men with a foundation of FACTS under them.

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The majority of modern American Aeronautical Engines are equipped with SCINTILLA AIRCRAFT MAGNETOS.

They are the choice of aeronautical engineers because of their

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Contractors to the U.S. Army and Navy

(Continued from preceding page)

the scene than army; more executives, experts, promoters, financiers, aviation brokers, traffic managers, insurance agents, publicity racketeers, blonde stenographers and minor officers of every conceivable kind and color than all the passengers and pilots in the country combined.

In this age of miracles it is still possible to wonder where all the executives come from. They seem to accumulate like relatives around a last will and testament, and for that matter they are very commonly relatives of somebody or other. The list of officers of a first-class aviation corporation is liable to look like a family tree, with the customary amount of suckers, graft and deadwood on it. And the reason for that, of course, is that wherever there is money there will be customers for it, just as where there's a will there are relatives.

It seems absurd to suppose that too much money ever did a business any harm. But on this matter I should know. During one of the intervals between my customary periods of honest poverty, I went into business on a big scale, very much as Andy does every other night on the radio. It was a business which I knew a little about and at which I had made occasional if moderate profits. The big idea was to do a great deal more business and thereby make a great deal more money. So I discovered a partner and with his misguided coöperation and assistance borrowed $10,000.

You gents who use thousand-dollar bills as bookmarkers needn't laugh. Ten thousand dollars was a lot of money then, and considerable now. And it was a darned sight more than I knew what to do with.

Well, here was a nice little business with money in the bank, and nothing to do but make it earn its keep. But unfortunately we didn't seem to be able to keep it. It ran out of all the seams in the business and found new ones faster than we could patch them. It made suckers of its proprietors for every salesman who came along, and tempted them into overstocking, careless cost accounting and every other ill that business is heir to. It took all our bright ideas on the first bounce and ran away with them. It suggested new departments for the business before we knew how to manage the old ones. And it paid the salaries of the proprietors so regularly and easily that they omitted to earn them.

When that business died, as, of course, it did at last, the correct diagnosis of the fatal disease was fatty degeneration of the pocket book. The business was cursed by its own excess capital—capital out of proportion to its owners' experience, caution and working capacity. You wouldn't think that $10,000 could be all that, but that's because you don't know the guys who had it to play with.

This identical thing has been happening to aviation, with millions for chips instead of thousands. The millions came, of course, largely from the public's pocket. The regrettable and unfortunate sequel to the story is that a lot of them will never get back there.

Colonel Lindbergh may not have intended to speak in parables when he declined his monument and preferred to be remembered as the boy who flew the mail. But there's a parable there, just the same, the interpretation of which is that there is no substitute for the regular routine of the job and no enduring value in anything but work. Money, mergers and mahogany furniture put up a nice front for the customers but won't yield any solid nourishment for stockholders or other creditors. And the cheerful song of air-minded optimism must have a steady accompaniment of the ringing of cash registers or it is liable to grow suddenly

(Continued on next page)

3 pioneers pass another milestone of dependable service

The passing of 1929 marked the close of another year of dependable service by the air mail . . . that pioneer of commercial aviation.

Likewise, 1929 marked the completion of a year of dependable service by two other pioneers in the aviation industry . . . Stanolind Aviation Gasoline, Stanolind Aero Oil. Early in the history of commercial aviation these two products began to contribute their share to the success of flying. No more convincing proof of the dependability with which they perform can be found than in the record they have made . . . many thousands of flying hours with never an engine failure traceable to any fault in either of these products.

Today Stanolind Aviation Gasoline and Aero Oils are better than ever. Constant research work keeps them up to date to meet the ever changing requirements for aviation fuel and lubrication.

Stanolind Aviation Gasoline and Aero Oils are well known at midwestern airports and preferred by the majority of pilots. These men know that they can rely on Stanolind Aero Products.

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Model AR 594C
105 to 125 Volt, 50 to 60 Cycle
Alternating Current Operation
$125 (less Radiotrons and Loudspeaker)

UTILIZING the new screen-grid and power-amplifying Radiotrons for the reception of Department of Commerce Radio Broadcasts of weather and landing conditions.

Through the use of this receiver at the airport, pilots who are about to take off will be fully informed of weather and landing conditions along the route they propose to fly.

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(Continued from preceding page)

sour and soon cease altogether.

It is an encouraging sign that the industry has been overtaken by a mood of economy, which may be mixed with the repentance of the morning after. It has so far been only locally effective, but there is hope. In the meantime, our friends, the pilots, are finding themselves rather pointedly in the line of fire of the new policy. Some of the brethren are cutting rates on the boys who do the flying, which may be ultimately necessary but is just now a distinctly unpleasant experience for the victims. They are disposed to holler, which is no less than might be expected, and their protest has been presented with reason and restraint. But behind it we seem to hear the echoes of suspicion that other salaries might be cut or saved altogether and that for economy as for other things there's always room at the top. And it's beginning to be obvious even to the innocent bystander that aviation is carrying too big a load of excess baggage, stowaways and deadhead passengers for its own good or the good of its appointed destiny. The first outstanding company that says so and cuts its Sunday coat to fit its business back is going to be a pioneer, 1930 model, and the prophet of a new era.

One word more on monuments and we are done with them. There are a couple of them afloat just now on the deep blue sea, and known respectively as the *Saratoga* and the *Lexington*. Just what they are monuments to it's up to you to guess, though the Navy Department might tell you if it chose and dared. But lately they came up in the news again.

It happened while the good ship *George Washington* was on its way to Europe, loaded to the water line with delegates determined on discovering how long is a yardstick. Some three days out from shore the ordinary amusements of shipboard palled a little, which is very likely to happen on the best regulated liners. However, the questions of capital ships and cruisers were worn a little thin, and nothing new to say about them until London and Paris said something. So somebody mentioned aircraft carriers and a good time was immediately had by all.

The outcome was that the American experts on limitations and things like that began to wonder whether somebody hadn't slipped on a carefully planted banana peel in omitting small aircraft carriers from the terms of the Washington Treaty. The naval nations had sworn solemnly enough to be reasonable in constructing carriers of more than 10,000 tons, but said nothing about little ones. And here was the biggest nation in the world with the biggest carriers in the world, waking up to wonder what would happen if a whole fleet of nice little, fast little, cheap little carriers should put to sea against them, each with a load of hornets on board and no friendly intentions whatever toward the *Saratoga*, the *Lexington*, the American Navy and our coastwise cities.

The cry, of course, is for more limitation agreements, and in default of these, a busy building program of carriers of cruiser size, which can be where they are wanted when they are wanted, can be somewhat less conspicuous than a flatboat in a duck pond, can outrace a battleship, can be built without bursting the national pocketbook, and can unload their battle planes before the battle is over. Also it begins to be suspected that it might be well not to put all the eggs in two baskets, even such nice baskets as the *Lexington* and *Saratoga*. And in one way or another, the experts are all upset, having suddenly discovered that aircraft may have considerable to do with the outcome of the

(Continued on next page)

MOTO METER

GAUGE & EQUIPMENT CORPORATION

THE name MOTO METER is a guarantee of the excellence of any instrument or gauge on which it is placed. The three great plants of this company, now one of the world's largest manufacturers of gauges and allied equipment, are devoted to the manufacture of products of the highest quality.

Plant at Long Island City, N. Y., devoted to the manufacture of industrial, marine and aviation instruments and gauges

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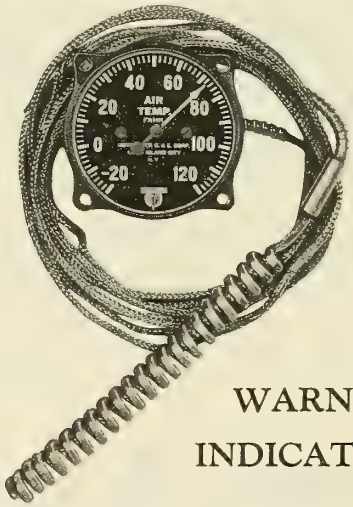

ICE WARNING INDICATORS

The Moto Meter Ice Warning Indicator informs the pilot of the atmospheric conditions through which he is flying and enables him to avoid temperatures under which ice might form.

Two atmospheric conditions control ice formation—high humidity and low temperature. High humidity is easily seen as rain, fog, mist, etc. The Moto Meter Ice Warning Indicator keeps the pilot constantly informed of air temperatures.

This instrument is now being used by many of the leading Transport companies.

Aviation Needs Trained Men! = Big Pay for Ground Men and Flyers

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GET complete, intensive Aviation training! That's the key to success! Get it at Lincoln —where "Lindy" learned! Come to the famous Lincoln Airplane and Flying School. This school is well known in factories and airports throughout this country as the school that turns out better trained pilots and ground men.

Unusual Facilities—Take advantage of our exceptional facilities. We have more than $250,000.00 worth of buildings and equipment. A large production airplane factory in connection. A modern 160-acre flying field. Plenty of new production, government-licensed open cockpit and cabin planes. Expert government-licensed pilot and airplane mechanic instructors.
Practical Instruction—You learn under factory standards on actual airplanes and engines.

Learn aerodynamics, meteorology, instruments and other important subjects. We train you for a private, limited commercial, industrial or transport pilot's license. Make you a safe, dependable pilot.

We Help You Get a Paying Position—The demand for Lincoln-trained men is great. We have placed graduates without delay. We will help you get a job!

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Get FREE Book, "Aviation Beckons You"—just off the press. Tells everything you want to know about Lincoln School, low tuition, etc. Tells about "Lindy" at Lincoln. Write today. State age.

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(*Continued from preceding page*)

next naval battle.

In the meantime there are the *Lexington* and *Saratoga*, monuments to something or other, and none of the naval nations apparently envious of them. It's just too bad. Maybe they should be towed up the Potomac and anchored in sight of the Navy Building. They might remind the gentlemen who work and worry there that it will be just as well next time to think in terms of practical aviation instead of in terms of deserving shipyards and grandstand politics. For they are monuments already to a misguided policy, which tried to make aviation a spectacular sideline to the battle fleet instead of its first line of offense.

You may gather from these few observations that I don't care much for monuments. I don't. Nobody has put one up for me yet; nobody has even suggested it. The nearest I've come to date to a memorial is the fact that the lane which borders my suburban estate is called Rose Lane, possibly because mine was the first house to lie along it. But since it's a rough road, full of cinders and mud, and doesn't lead anywhere in particular, the compliment seems somewhat less clear-cut than it might be. And anyway, what's in a name? A rose by any other name would have bugs on it, at least in this section of the country.

THE TRADE-IN PROBLEM

(*Continued from page 77*)

dealer's associations to mitigate the used airplane problem serve merely to keep down losses. The only way to tackle the question is to do business on a basis that will give the dealer a profit on the sale of the used plane even if a used plane is traded in as part of the transaction, and for manufacturers to help their dealers by not over-stocking them with new planes. Over-stocking forces dealers to sell at a loss because of the over-allowances they must give on used planes in order to make sales. The practice of manufacturers to exert sales pressure on their dealers will result in a large mortality rate among dealers. A policy that means profitable sales for the manufacturer at the expense of the dealer is unsound and is bound to react adversely on the manufacturer.

WHAT DO YOU MEAN—"AIR-MINDED"?

(*Continued from page 65*)

'for' aviation and think it is a good thing."

Ah! I was beginning to learn things. To be air-minded one simply had to be "for" or "in favor of" aviation.

A few days later, in another town, I met another acquaintance—a bank president. He made my private investigation easy by introducing the subject himself.

"How's the air game?" he inquired heartily, after which, with a proud gesture, he immediately set out to describe the glowing details of how he had taken part, only a few days before, in the inauguration of the new air mail service linking his town with the rest of the great air mail system.

"I am proud to say," he went on, "that I have had an active hand in this progressive step," with which he proceeded to show me the home town paper carrying a picture of himself along with a group of other prominent citizens in the act of dropping letters and parcels in the pouch carrying the first shipment of air mail from the city.

"That's fine," I remarked, "and I presume you have already found this service a great saving and facility in your banking business?"

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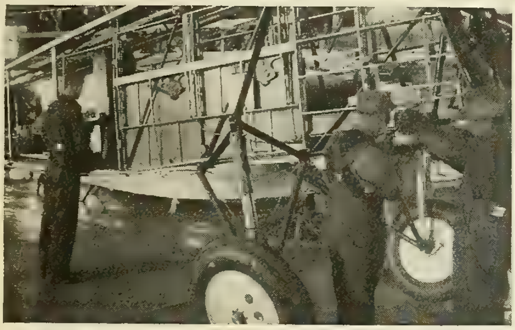
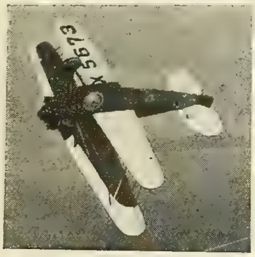
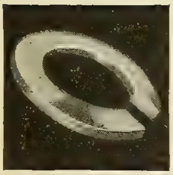
HOBBS LOCK WASHERS

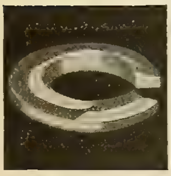


MAKE A BETTER JOB





IT'S a satisfying thought to realize that when your ships come off the line the pilots who fly them will ride secure in really fine airplanes — airplanes fine in design, fine in construction, fine in every detail . . . . right down to the very lock washers used in their assembly. And it's comforting to know that whether in serene straight flight or violent maneuver, your ships are going to stick together . . . . that no nut will sheer off its bolt or no screw pull loose from its bed because you used cheap hardware. ¶ Good lock washers are appreciated most in the shop, though, where they are seen and handled. Workmen like to use Hobbs Lock Washers. When they reach into the box for one lock washer they don't pull out a whole string of them to be unravelled like a trick puzzle. And when they slip them over a bolt or around a screw workmen who have used Hobbs Lock Washers before know that that's one job they can forget . . . . that that bolt or screw won't come lose until the plane is ready to be dismantled for spare parts. ¶ Hobbs Lock Washers will be shipped promptly in any size, kind or quantity on short notice. Samples and prices gladly furnished.



HOBBS MANUFACTURING CO.
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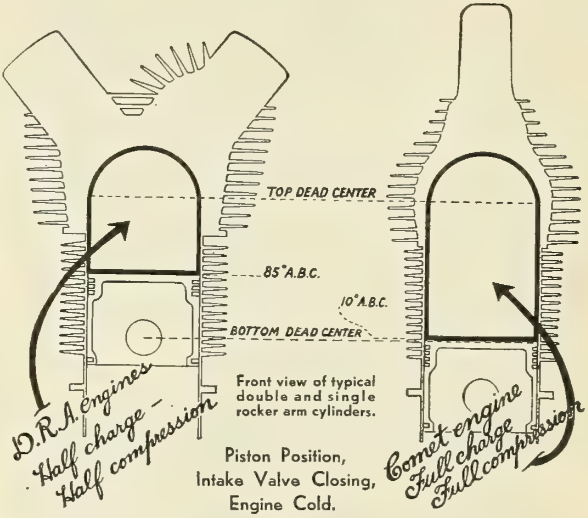
Not Members of Any Combine

A COLD "COMET"
"takes the gun"
for Safety



Front view of typical double and single rocker arm cylinders.

Piston Position,
Intake Valve Closing,
Engine Cold.

GLIDE in for a landing—from one, five, ten thousand feet—with the throttle completely closed—no need to "gun" the engine constantly to keep it warm—the Comet will not "conk out" just when you need positive power for a safe landing—that common fault is eliminated in the basic design of the valve gear.

WHY?

All cylinders "grow" in height as they warm up, and contract as they cool. This change alters the valve clearances and the valve timing. Most conventional engines make no attempt to compensate for this change. Their intake valves close later when cold than when hot—about 85 degrees after bottom dead center, instead of 45 degrees after. The full charge drawn into the cylinder is partially blown out on the compression stroke, and the remaining mixture is only half compressed. The weak explosions resulting are frequently insufficient to give quick acceleration, and the engine "conks out" just when safety demands instant power. And that is when the Comet valve gear has its advantage.

Look at the sketches.

Because of the single rocker arm action, the Comet intake valve closes earlier when cold than when hot—10 degrees after bottom dead center instead of 45 degrees after. With the engine cold, a full charge gets full compression. Positive, powerful explosions result. The engine "takes the gun" even after the cylinders are thoroughly cooled during a long glide.

The same action helps in starting. The priming charge is fully compressed and exploded. Even on the coldest days Comet engines start with ease. No delays. No broken engagements.

The single rocker arm valve gear, found only on the Comet, is the safeguard against engine failure. It assures positive power when power is most needed. It is another reason why owners of Comet engines are

at ease in the air

COMET ENGINE CORPORATION
MADISON, WISCONSIN U. S. A.

Comet aircraft engines are manufactured at Madison, Wisconsin, under the direction of the Gisholt Machine Company, for 40 years builders of fine machine tools in use throughout the world

A
REVELATION
Writes
Lieut. E. Verne Stewart

"The fast, positive opening of my Floyd Smith Safety Chute surprised everyone, including myself—and the landing itself was another revelation."

The Safety Chute is designed for modern flying. Smaller, lighter, more compact, with three positive opening actions direct from the rip, it is an entirely new departure in parachute construction.

No vital parts exposed . . . nothing to go out of order, it is simplicity itself; the ultimate in Parachutes.

Write for infomation on dealer's franchise and ask for illustrated booklet COMING DOWN.

**SWITLIK
MANUFACTURING
COMPANY
Trenton, N. J.**

(Continued from preceding page)

"Why-er-I, well, you see," he stammered, "we haven't gone into that phase of it as yet. This air mail thing, I'll admit, is a clever idea, a remarkable development, and it will certainly place our town on the map, and the fellows who are doing this pioneer work should come in for a lot of praise. I'm proud to say our citizens got behind it and put it over with a bang. You should have seen the crowd at the airport to witness the first ship come in. They had to put on an extra plane to help haul the big shipment of mail from here."

"But you don't use the air mail regularly?" I inquired.

"No-o-o, not as yet. We haven't considered it from that angle. However, I think my boy gets off an air mail letter now and then just for the fun of it. I've bought several stamps for him."

"And so you are air-minded," I remarked with open sarcasm.

"Sure," he came back with flash, and I left him still flattering himself in that belief.

As I traveled about the country, I developed a sort of complex in my effort to mitigate the terrible fear in my mind that the country is not air-minded. Perhaps my survey had not been broad enough. I decided I must carry my investigation farther in order to deduce an accurate conclusion. Accordingly, I limited my campaign among those whom I recalled as more flamboyantly "for" or "in favor of" aviation. I directed my attention to a group of sales executives, bankers, wealthy sportsmen, public officials, and others of similar importance who could afford to use an airplane for travel, or who could in one way or another lend material support to the industry and get value received for doing so. I had asked so many people if they are air-minded that the report was getting scattered about that I was developing a monomania on the subject. Several persons I hoped to interview avoided me openly or refused to be drawn out on the question. I began to get hard-boiled. I was certain I was making a lot of enemies but I had become as one inspired. I was a lone and self-appointed agent calling the hand of the great army of "modocks."

Although I am still making observations on the subject, I am about to decide that the idea of this country being air-minded is a bubble. All the fuss, all the ballyhoo, all the dinners, the air tours, the air circuses, and last but by no means least, the cash donations have gone for little. The good deriving therefrom might be confined to the increased sale of winged pins and society memberships, but the damage is infinitely greater. A false notion of the real significance of air-mindedness has caused airplane manufacturers to spend millions in a grand rush to supply airplanes for a market which does not exist. It has caused millions to invest their hard-earned savings in fly-by-night aviation rackets based solely on the glamorous stock promoter dreams of skies darkened by aircraft and an airport in every "tater" patch. So great was the delusion that many manufacturers thought it wasn't necessary to develop a sales staff to dispose of airplanes; an "air-minded" public awaited them with open arms. Likewise, the notion sprang up that all that was necessary was to establish air mail lines and the air-minded leaders of the community would fill the ships with bulging mail sacks; establish passenger transport lines and the public would clamor for an opportunity to use this new and novel mode of travel; take over a sales agency and every air-minded citizen of the community who can afford it would buy a ship.

(Continued on next page)

The Nation's Aces Keep Warm And Comfortable In The Coldest Flying Weather!

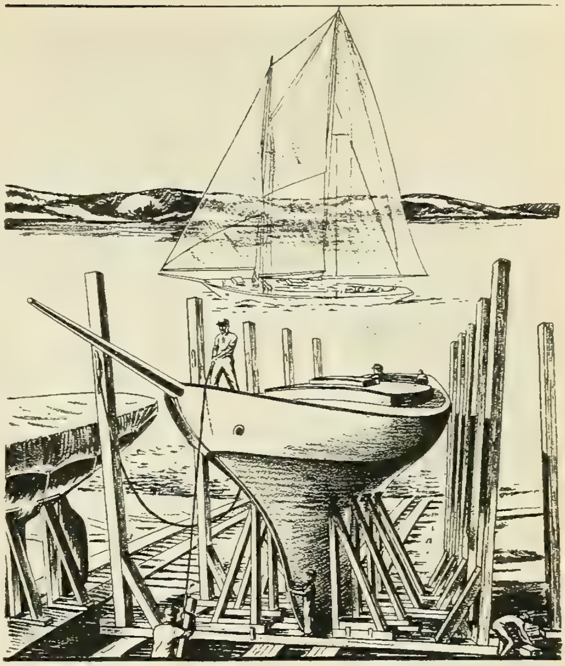
Watch those pilots who do record flying when the air snaps with frost and frigid temperatures beat back all but the properly clothed. All of these pilots are dressed in warmth and comfort. Most of them are dressed in Snappy Snug Flying Clothes.

Arthur C. Goebel

One of the pilots of national renown who enjoys warmth and comfort in SNAPPY SNUG FLYING TOGS.

SNAPPY-SNUG FLYING CLOTHES

Canvas Leather Specialty Co.
Trenton, New Jersey

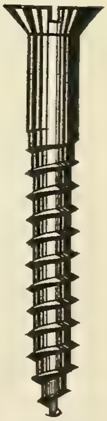


She will sail again Next Summer

Late winter and spring finds unusually busy days at ship yards up and down the coast. Boats of all kinds are being reconditioned and re-equipped for the coming summer.

In almost every one of the many active yards you will find thousands of American Screws being used in boat building and repair work.

American Screws are selected because their strong slots stand the strain of automatic or hand driving; their true running threads hold them permanently in place. You can do any job better with American Screws.



Our chart telling the sizes and kinds of American Screws will be sent *free* on request.

MADE IN THE UNITED STATES OF AMERICA

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AMERICAN SCREW CO.

PROVIDENCE, R.I., U.S.A.
WESTERN DEPOT, 225 WEST RANDOLPH ST., CHICAGO, ILL.

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You can go over the rigging faster, and do a more accurate job of checking with a Starrett Tape.

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And the Starrett Tape No. 530 is moderately priced. See it at your dealer's. Meantime, send for the Starrett Catalog No. 24"AD." It shows all the Starrett Tapes and over 2500 other Starrett Tools—a mighty good reference book on fine tools.

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World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
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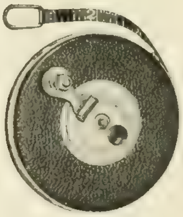

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(Continued from preceding page)

What do you mean "Air-Minded"? This country is no more air-minded today than it is "Volstead-minded." It appears to me that the sooner the aeronautical industry discovers this the better. I am an advocate for starting a new "air-minded" campaign, and believe me, those who join my clan will have to do more than wear a winged pin.

FLYING THE AIR ROUTE TO CUBA

(Continued from page 71)

it, and that is a big help. Unfortunately, though the station from which the general information comes is miles away and cannot see or judge actual conditions in the immediate vicinity of the plane. One has to rely on himself; and with coaching, practice and experience the pilot can learn to "read the water" as accurately as he does land signs.

If, for example, the wind is from the east, and blowing ten or fifteen miles an hour out over the Gulf Stream, there will be fairly numerous whitecaps of moderate size. These whitecaps roll up, over, and break toward the west, immediately followed by a backwash of foam towards the east. This backwash of foam, going towards the east, very accurately indicates that the wind is coming from that direction.

The velocity of this wind is just as important as the direction, but there is no royal road to success in determining that. The Gulf Stream flows approximately towards the northwest. If the wind from the eastern quarter is at ten or twelve miles per hour, there will be fairly numerous whitecaps, and these will increase in size and number in direct proportion to the increase in velocity of the wind. Therefore the pilot must learn to "know his oceans" by constant study and comparison with previous trips.

If the wind is blowing in the same direction in which the Gulf Stream is flowing, there will be few if any whitecaps, and he can rely upon his radio, wind ripples on the water, and a compass bearing from the home port if necessary.

Whether flying over land or water, a perfectly straight course is desirable, for obvious reasons. But if the wind is drifting the plane to the right or left, something must be done about it; the pilot must figure how much allowance he has to make to overcome this drift and maintain a straight line to his destination. If the wind direction and velocity are known, it is a simple matter to plot the drift angle, and obtain the proper course to fly. This heading will not be directly towards the destination, for the plane will be heading sufficiently into the wind to take care of the drift, and will therefore be flying rather sideways, as the crab travels on a beach, but straight nevertheless. A rule of thumb method, which has been satisfactorily proved, is to allow one degree on the compass for each two miles of wind blowing, assuming an air speed of 110 miles per hour.

There are several other things that require the pilot's attention, chiefly among which are the following instruments on trimotored ships: three tachometers, three oil pressure gauges, three throttles, two compasses, one altimeter, one bank and turn indicator, one climb indicator, one air speed indicator, one clock, and one fuel gauge, and of sufficient importance to warrant a glance, are the three switches, the master switch, one booster magneto selector switch, and a pressure pump, not to mention the wheel brake lever.

The cloud formations and the ceiling are necessary con-

(Continued on next page)

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(*Continued from preceding page*)

siderations, as is the weather in general or perhaps a rain squall in particular. Then there are a few radio reports to be sent, giving the plane's position from time to time. It is desirable to consider the safety and comfort of the passengers at all times, to look out for other ships that may be in the air; and last, but by no means least, to arrive on time.

Of the instruments, the tachometers are highly important. They hold a finger, as it were, on the pulse of the engines and indicate instantly any little disorders like dyspepsia, laryngitis, or whooping cough.

The next little triplets are the oil pressure gauges; and they are willing to take oath that all is, or is not, well with the lubricating system.

Their little playmates, also triplets, next-door neighbors, are the oil temperature gauges. They hope to die and go to the bad place if the temperature of the engines is a degree more than 68 for the left motor, 70 for the center, and 67 for the right motor.

The funny little fellows over here are too nice to disagree, so they all say in union, "five pounds to the square inch." Those are the fuel pressure gauges.

The trio of dumbbells with the wooden heads are the throttles. Now and then, when an engine steps out of synchronization and lets out a howl like the wail of a lost soul, a touch on the proper throttle will usually act like soothing syrup to a baby with the colic.

The compasses! Alas, like the male of the species and his spouse—they never agree. But strange to say, the master compass does practically all of the talking. One rarely pays any attention to the spouse. We don't know what she says, but we know she's wrong, anyhow. The big fellow's one of our very best friends, especially in tough weather.

The dizzy fellow up here is the altimeter. He tells you, more or less accurately, how high you are above sea level. Around the beach he's not so bad, but in the mountains he's quite a problem. Anyway, he's a big help to the pilot, and works nicely in harness with the climb indicator when blind flying has to be done.

The climb indicator registers "Zero" when the ship is in level flights; and shows "Down" in degress, when you are diving or losing altitude with the nose down. It reads "Up" in degrees if you are climbing.

The air speed indicator shows the speed that you should be making if it were not for helping or hindering winds. If, without speeding up the engines, the instrument increases its reading, it's a pretty good sign that you're diving. The reverse is true if the indicator decreases the reading. In weather where the visibility is poor, it is valuable to prevent a loss of forward speed by warning the pilot that he is probably climbing at too steep an angle.

The bank and turn indicator shows whether or not the ship is maintaining straight and level flight. The switches, fuel gauge and clock are self explanatory.

A casual glance at this last-named instrument, has cost co-pilots innumerable luncheons. When they feel that they are getting along fairly well, one of them will unwisely offer to bet the senior pilot for the luncheons that he can guess the time of arrival more correctly than the latter. Usually a most imprudent move on the part of the co-pilot, for the senior has probably already figured it out with painful accuracy. The co-pilot points to 11:55 o'clock, and the senior hates to take the money (in a pig's eye, he does!). He points to 11:10, and remarks that he'll take

(*Continued on next page*)

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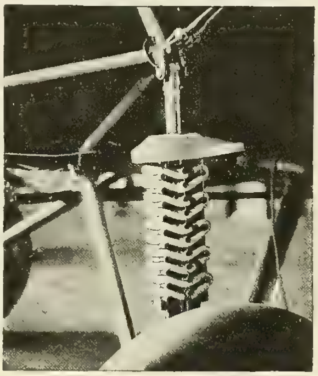

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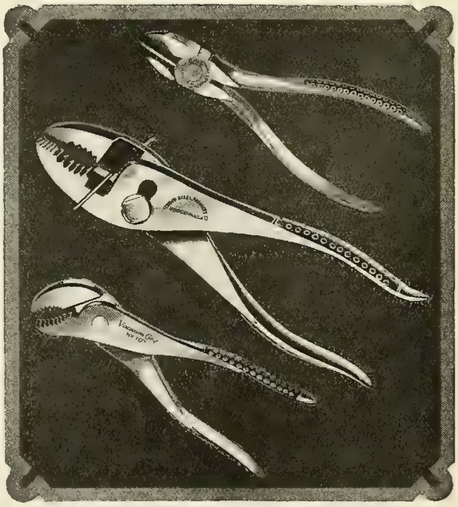

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ALL AIR-LANES LEAD TO NEW YORK

(Continued from preceding page)

chicken, an alligator pear, dessert, coffee and a two-bit cigar. And the co-pilot doesn't believe him until they touch the ground in Havana at 11:09.

The liner taxies towards the passenger terminal, and the senior laughs up his coat sleeve. The local field manager, a very business-like and efficient individual, has everything in readiness. His assistants are trained to act with military precision, and the task of clearing ship goes along smoothly and with dispatch.

The senior pilot, much after the fashion of the sea captain, has left the ship, with the "ship's papers"; and the passengers, follow into the customs room, where baggage is inspected, tickets are punched, and cherished American cigarettes and cigars sadly surrendered to the customs inspector. Someone remarks that it's an "old Spanish custom" so they all laugh that one off, and let it go at that. How is one going to argue in Spanish when all he knows is "Bonus Deeus, Seenyor." He's licked before he starts. So the passengers pile into the sleek streamlined little aerocar that waits outside the door, and settle down to the smoothest ride they've ever had on wheels. Up front sits the steward, immaculate in whites, with innumerable gold buttons up and down his chest, and a rakish cap on the side of his head.

The pilots are tired and weary from the flight, and really are not interested in seeing or hearing anything even remotely connected with aviation for the next hour at least. So they pull up a pair of comfortable, well-cushioned chairs out on the veranda, where they can watch the Cuban cadets fly, and spend the rest of the hour just talking, about. . . . aviation.

AIR—HOT AND OTHERWISE

(Continued from page 66)

either due to the lack of confidence or the high rates. Experiments in low rates now being tried will prove which has been the retrogressive influence. And even if low rates increase the traffic, low rates plus high safety will increase it more—meaning more planes, more pilots, more mechanics and general prosperity.

Gentlemen of the industry, every man in it, from the Wall Street financier to the humblest airport laborer, let's face these facts and rectify the evil in them.

Other industries have changed bad conditions. Are we going to fail? One hundred per cent coöperation must be given by everyone concerned if you value your own business, your profits and your future. For everyone to preach and practice safety during 1930 would do more for everyone concerned than all the stunt shows, exhibitions and unjustified publicity.

THE READY LETTER WRITERS

(Continued from page 64)

I owed them everything from money right on down, or up, or sideways. For all time I was their debtor; and they were hot-foot to collect the debt. That was the unanimous and hearty opinion of the whole caboodle of them.

When one is attacked from all sides, one naturally starts to build defenses; and although I was a minority of one against a majority of about two dozen, by the summer of 1926, I did battle as boldly as I could. The gentleman who had been apparently incapacitated for labor, owing to the pain in the side his immoderate laughter at my feeble jokes had caused him to suffer, I straightway advised to stop reading me. "Lay off me," I cautioned him, "lest my

(Continued on next page)

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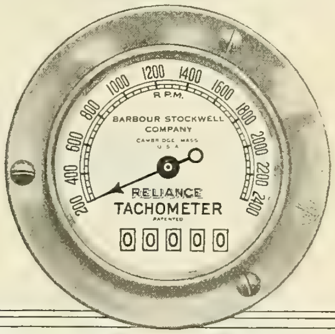

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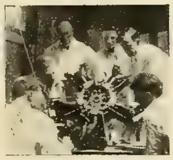

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(*Continued from preceding page*)

writings do you a permanent injury. Take on Doctor Cadman or Glenn Frank. Read about the serious side of life—and go to work, because I'm broke, myself." I wasn't, as it happened, but a gentle lie turneth away wrath. Clearly, I owed this man money, for had he not read my works and —approved of them? Of course, and as the years rolled on and he continued to read me, I would owe him more and more. Well, I was content to owe him, forever and a day, and longer than that if he so desired. As for the reporter and his essay on stunt-flying, I returned the wretched thing and told him that the Editor had read it and pronounced it to be so excellent that if it were to be published it would so discourage the rest of our writers that they would give up in despair, perhaps commit suicide in their agony, and thus clutter up the office with cadavers which the Publisher would be put to the expense and annoyance of having carted away. That settled him, or killed him, for I never heard from him again. The mechanic I advised to place an ad in the Help Wanted column of the magazine, to find out if any one really wanted him. If they didn't, I intimated delicately, the natural course for him to pursue would be to go jump in the lake, but in any event not to bother me further, for I was out of a job myself. This effectually settled him, or sunk him, I don't know which. But I suspect that I lost him as a reader, for he hasn't written again.

Reverting for a moment to my school days, one of the text books in that Elementary Composition course—and you have no idea how elementary it was unless you struggled through one yourself—one of the books was called Wilkins' or Bilkins' Ready Letter Writer. I am not clear at this far date just what the miserable author's name was—it might have been Milkins or Pilkins, I don't know. But the title, Ready Letter Writer, hangs in my mind like an over-ripe cheese. And if I ever get my hands on the rascal who perpetrated the thing, I shall probably kill him. He offered specimens, I recollect, of every kind of letter that even the most nit-witted writer would care to write. There was one to the banker regarding an over-due note; another thanking a lady for an invitation to dinner; one to the minister asking him to baptize a child, if you had one; another to a Congressman, asking him for something (this was a popular specimen); one to the President, and one to a duchess inviting her to call for luncheon. I recall that last one, for it struck me that the duchess, if she accepted my invitation to luncheon, would be slightly startled to greet Ma in her old red wool wrapper and Pa in his stocking feet, which was his usual form of foot covering while engulfing nourishment. There were other specimens of ready letters, most of them equally useful to a bare-footed country kid with patches on his pants. I wondered at the time just what use I could make of the one to the Archbishop of Canterbury asking his opinion of the state of religion in the fifteenth century; and the one to the Amir of Afghanistan thanking him for allowing me to accompany him on a tiger hunt.

Still, I realize now that the kind of people who wrote to me each month, each week, some of them each day, could use any or all of these samples, and ask for more. In fact, I am persuaded that they *do* write to the Archbishop of Canterbury, and probably the Amir of Afghanistan as well. I'm sure they do. Certainly, they have as much reason to write to the Amir or to the Archbishop as they have to me; for to me they have no reason to write at all.

Be it distinctly understood that I do not refer here to

(*Continued on next page*)

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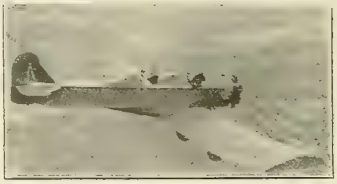

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(Continued from preceding page)

letters from pilots to be used in my PersonAIRlities department—I have asked for those letters and I want them, together with pictures. The chief interest of man is man (though I think it's woman, myself) and it is interesting to me to learn the facts about pilots' lives. Their lives are frequently enlightening, sometimes amusing, and seldom dull. And I know from letters that many readers like to learn something about the men who are carrying along this aviation business. So those letters are useful and desired. But the ones that are driving me surely and sadly to a yawning grave are the ones that—but let me give you a specimen or two, and you will see what I mean. And I assure you that I have not made up these literary gems; I lack talent for such work. In all their charm, in all their originality, they are presented to you as they were presented to me, unchanged except for the deletion of names and places, for I would betray no confidence. Try this on your phonograph:

"My dearest Cy:

That is really the way I feel about you, dear kindly unknown writer. You seem to have such understanding, such insight into human life that I feel I can come to you with my troubles, sure in the belief that you will throw out a helping hand, and if you don't I'm sure I don't know what I'll do, as I'm nearly distracted. In the first place, my husband doesn't understand me, and in the second place he doesn't want to, and in the first place he is more interested in other women; damn him, anyhow. I know that's no way to speak even about a husband, but you'd say the same if you had him, and I wish to land you had, though far be it from me to wish any such callamitty on you because you're not deserving of it, and that's a fact, I assure you. I hope you're always happy as I'm sure you deserve to be, but never mind that just now. You're there and I'm here and it's too far to go, so that's that and make the best of it as I do. But I just feel that I could put my head on your shoulder and have a good cry, and what a relief that would be, I'm sure, but there's no use even thinking of it unless you sent me the fare. And although I don't expect presents from men friends, even very devoted ones, I would make an exception in this case on account I do need comfort and that's a fact, sad I am to admit it, when we started out so well, all set for a life of understanding, and look what I got.

"Does he understand me and my problems? I'll tell the world he don't and don't want to, that's the tragidy of it, Cy, my dear friend. If he'd only try or pretend he was interested that would be one thing, but what I get is another and very different matter, I can tell you, my dear. But I've already tried your patience, so I will tell you all in my next letter.

"Your devoted reader,
"Mrs. Maggie Klutz."

Mrs. Klutz (that is not her name) in her mental anguish unfortunately neglected to include her address, so I was unable to send her by return mail the sympathy she evidently needed. Lacking this, the poor woman evidently lost confidence in me, or turned her attentions to another; for I never heard from her again, never. I have been worried about her, too. What happened, anyhow? Did *she* poison him? Or did *he* shoot her? And if so, was it just as well? I suspect that it was. Something tells me that if she belonged to me I should eventually, if not now, find it expedient to put her out of her suffering, if she didn't remove me first. I feel injured by her, anyhow. Her letter aroused my curiosity—and my wife's. We read

(Continued on next page)

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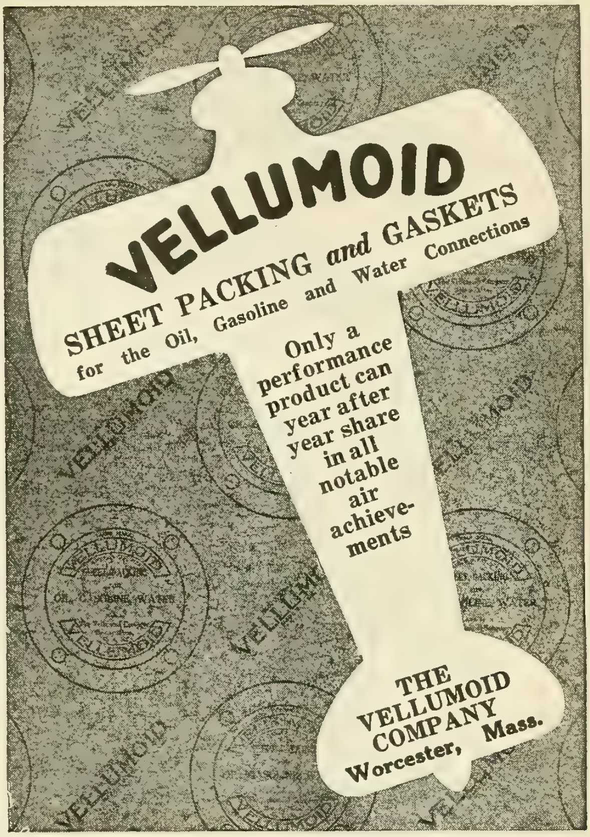
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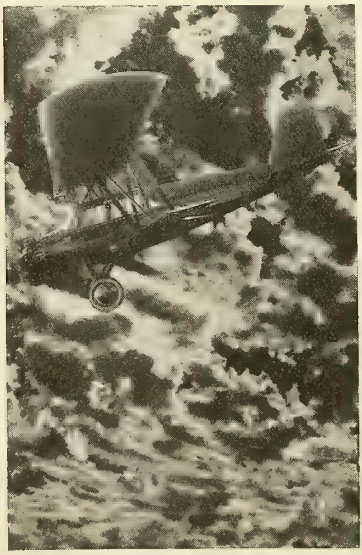

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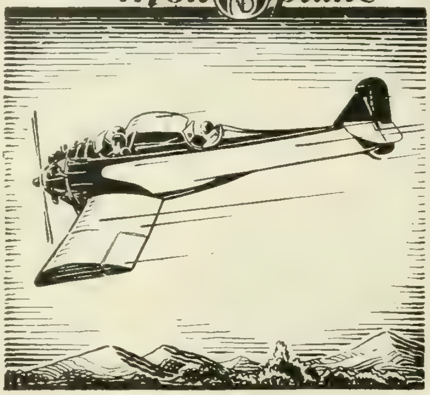

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(Continued from preceding page)

it over and compared guesses about her. What was her problem? Would it be solved? Or should it be? The accursed thing grew on us both, like a wart. We worried. "Any word from Mrs. Klutz?" I'd ask when I came home. Not a thing. Every mail from Aero Digest office became a new adventure. Had the Klutz told all, or even part? The Klutz had not, nor ever did. I still have the letter, two years old, and I still have my curiosity unappeased. Confound you, Klutz!

The letters from men and women, young, old and middle-aged, who have written something that they would like to sell to an editor—and can't—are so much alike that one or two will do as fair samples of the rest. Few of these letters are funny; to me, who have had so many things returned during the years from so many editors, they are merely pathetic. The only funny thing about them is the odd fact that the writers imagine, because I manage to get paid for my efforts, that I must have some peculiar drag with the editorial department. Probably a perusal of my work gives them this impression.

"Surely," I can imagine them thinking, "this fellow is not selling that junk on its *merit*. He must hold some dread secret over the head of the Editor and force the stuff on him."

With this thought in mind, evidently, they take pen in hand—few of them use typewriters, and many use pencils—to urge upon me the necessity of personally forcing their efforts on the Editor of Aero Digest. One article, for instance, related to the proper care and feeding of an infant destined to become a pilot. The diet recommended, I recall, was mainly vegetarian, with emphasis on whole-wheat bread—"to toughen the stomach of the child and make him impervious to air-sickness." Elliott White Springs himself couldn't sell an article like that to *Liberty*. But here's a typical letter:

"Dear Mr. Caldwell:

"I really should say 'Dear Cy,' for I feel that I know you, though you don't know me. I have been reading your articles now for two years and like them very much. You have given me a great amount of pleasure, off and on, and I sure like to read Aero Digest. It is my favorite magazine. If you write for any other, will you tell me the name of it and I will get that, too, so I won't miss anything.

"But what I wanted to ask you was this. Would you like to help me out on a little matter that isn't any trouble to you, but would be a great help to me? I've sent several real good stories to your Editor and they all came back. They came back so fast that I know the editor never read them at all, but simply sent them back because he was too lazy to read them, or I know they would have been printed. I had one, Cy, that was a whole lot funnier than anything you ever wrote or ever could write. Not that I say it as a boast, because I never do that. But I know the worth of my own literary work, that's all, Cy. And I know you won't feel hurt, but I was just comparing my article with that last one of yours. And boy! I had it all over you. I enclose the story so you will see for yourself and agree with me. I do hope you can sell it, or if you can't sell it under my name, print it under your own and go halfs with me if that's the best you'll do.

"With kindest regards, and remember that you are my favorite author, except James Warner Bellah and Elliott White Springs and Don Rose and a few more.

"Yours truly,
"Horatio Winterbottom."

(Continued on next page)

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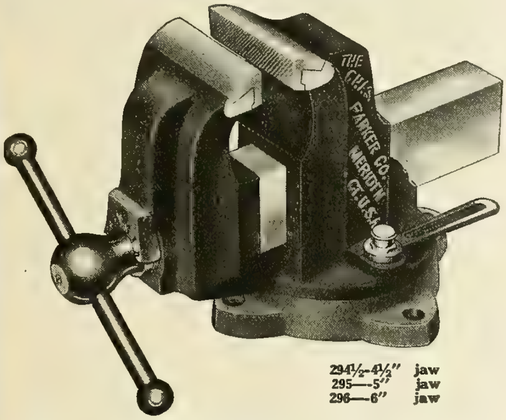

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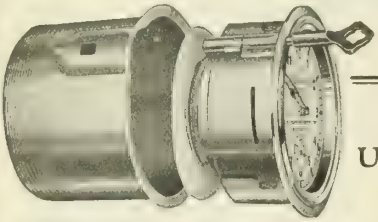

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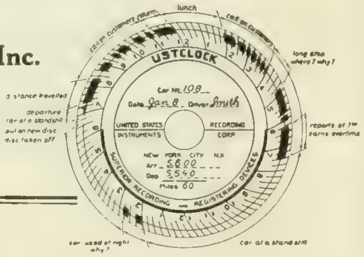

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(Continued from preceding page)

The artless ingenuousness of a letter like that—and I receive an average of a dozen a month—touches me. I know how that boy feels: he knows that he's good, and nobody else seems to recognize a fact that should be obvious at a glance. Evidently there is a conspiracy of indifference against him; and he calls upon me to break up that conspiracy and get him across to a yearning public! But what can I do? The poor boy can't write—he merely *wants* to write (just as I want to write a novel some day that I know in my heart I never will write, and if I do it will not be published). But can I say to that boy, "Son, as a writer you might make a fair plumber. Go thou and be a plumber." Perhaps I should, but I can't. It wouldn't do any good, anyhow. I would merely convince him that I was part of the fell conspiracy against him, and jealous of him, at that. So what do I do? Well, I dodge the issue, that's what I do. I thank him for his kind words, I profess to have enjoyed his yarn, I tell him that I have handed it to the Editor with a word of praise, and that the Editor will communicate with him. What are the facts of the case? Here they are: If I'm away from New York, as I usually am, I mail the story in. If I am in the office I put it on George's desk.

"What's that?" says George, who is up to his neck in work and glares angrily at me for disturbing him.

"A story," I say, "from a reader."

George continues to glare at me. "Listen!" he says. "I've got at least 10,000 words too much for this next issue already set up. Your story has got to be cut down 500 words and maybe more. Go and take out that much, and as much more as you can without ruining the sense of the thing, if any. No, you're *not* going to the hotel to do it—I know you and hotels. Sit down here and start hacking, or I'll have to do it myself. And you know me!" I do. He'll just chop off 500 at the end and leave the ending hanging in the air, that's what he'll do. So instead of selling George poor suffering Horatio's article, I have to sit down and take back about a quarter of my own.

For the benefit of young men and women who think I have some pull with the Editor, let me say that I haven't a drop. But all articles are read, and if suitable are accepted. The delusion that editors do not read stories submitted to them persists in all literary quarters—and it is a delusion. I do not suggest that every word of every story is read—it is not. But enough is perused to satisfy the editor that he does or not want the story; and usually no more than a paragraph or two need be read in order to learn if the rest is worth wading through. Years ago I used to think that editors had simply neglected to read my offerings. I have read those offerings since, and I will declare that any editor who accepted any of them should have been fired, instanter. So will yearning literary lights—please pass me by and address the Editor direct? It will save you time and me postage.

Another example of a letter from a literary man in embryo—a larval literary man, we might say—will suffice to show the agony I endure at times.

"Cy Caldwell, Sir:

"You may think you're smart, but I'm damned if I do. The kind of bilge you sell that AERO DIGEST you should be prosecuted for and then some. AND THEN SOME, MISTER! What makes me mad is that a charlatan like you can make a living selling junk while I, an artist in words, go unrecognized. It makes my blood boil, I can

(Continued on next page)

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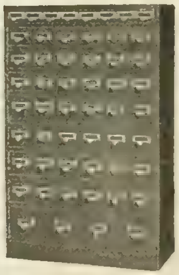

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(*Continued from preceding page*)

tell you that. Here I went and sent three stories—three, mind you!—to that editor of yours, and he sent them back. The nerve of him! If I wasn't so far off, I'd walk in and land him one, and you, too. GET THAT!

"Now, as one writing man to another, I ask that you take this here story in personally and tell him to print it. It's better than anything you have ever done, you know that. And it's better than anything that has ever appeared in your paper, so get it in, and be damned to you! If you don't, you're not even worthy of the name of a MAN and I'm right here to tell you that and you know me. That's all, from your annoyed reader,

"Percy Lionel Peckenpaugh."

Well, I fear you think I made that one up, but I did not. Percy and Lionel were the real names of this warlike individual—though I have disguised the last one. And how any one named Percy Lionel could have penned that letter—and he did, with a very scratchy pen—is far beyond me. I can only sit and stare at the thing in wonder and admiration. If his story has been as good as his letter, I have no doubt that it would have gone in. But it wasn't. What do you think it was? Since you'd never guess, I'll tell you. It was the account of an imaginary trip to the moon, by airplane, with a heroine, aged seventeen, saving the day for her sweetheart! Now, I ask you, what can I do for a man like that? Yet I suppose this chap hates me worse than poison because the Editor returned his story with thanks.

However, let's slide away from these writers—most writers are mad, anyhow—and examine an exhibit from a lady. This one came to me, under a Chicago postmark, but with no other address. Since this lady obviously craves information, I use her real name, and if you can help her, just write. Write her, I mean, not me. I'm overburdened now.

Jan. 12, 1929.

"Dear Mr. Cy Caldwell,

Dear Sir:—

I bought an aeroplane magazine and I read your article, and you seem to be one of the fellows who is a pilot. And you said you were married, so I don't want you to think I am fresh but I want you to help me out, only I guess that's the trouble I am already out. You see I go to the High School and am considered good-looking, that is, I don't think so but some of the fellows do I guess. Anyway there was a great big aeroplane, I think they said it was a Ford (3 propellors only it didn't look like a Ford to me) and it had "Queen City Airlines" painted on the sides. And it landed at ————, Ohio, where I was visiting my aunt. The fellow that was running it was real good-looking and he let me keep the photo which I am sending because I thought maybe you had seen him up at that show at Chicago, only I don't think he drinks because he was so nice and everything. And he didn't write me a letter like he said maybe he would. So if you see him and if he has been killed or anything, kindly let me know because I am beginning to be worried about him because I think aviation is dangerous don't you? Hoping you are the same,

Very truly yours,
Emma Victoria Wilson,
"Chicago, Illinois."

—

Now, I fear you will think that I made this letter up. But I swear I didn't, and the Editor will confirm this

(*Continued on next page*)

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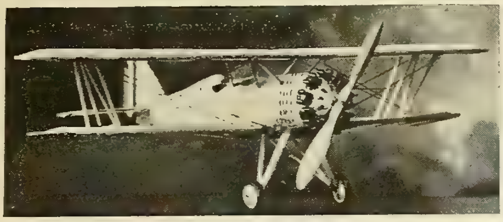

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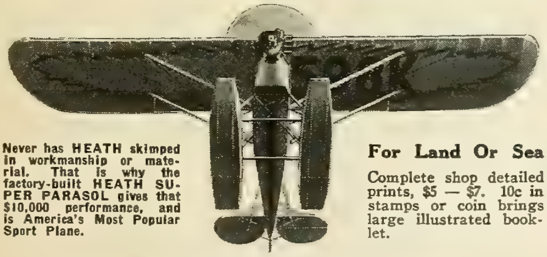

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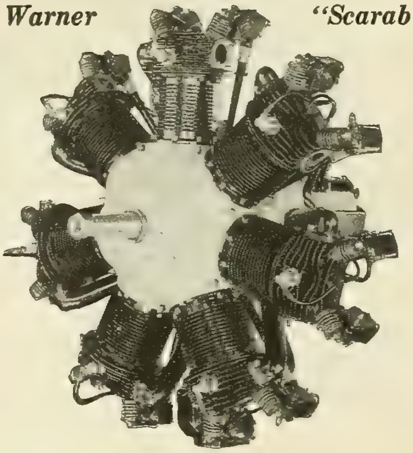

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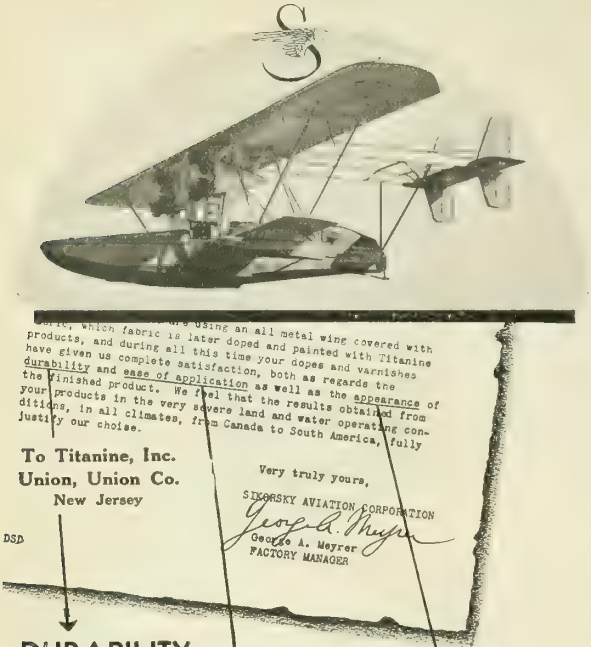

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(*Continued from preceding page*)

statement. (The original letter is on file at AERO DIGEST office and may be inspected by the incredulous.—Ed.) There's the letter, and a picture of the fascinating pilot was received with it. I leave the rest on the knees of the gods. I hope, whoever he may be, he is single, and that I am not causing any trouble at home. But the letter was really too good to leave out. The girl tells me to "let her know" and then says she won't give me her address in case I would think she was fresh. Can anything be more charming and youthful—mentally?

Letters from kind readers have increased to such an extent that it would be physically impossible for me to answer them all individually, and still have enough time left to write articles, fly, eat, sleep, etc. I had to cut out something, or go boom, so I cut out answering any letters that my talented secretary in New York could answer for me. For instance, letters from pilots obviously require no more than a brief acknowledgment that Miss Betty Buttonoff, my charming secretary, could write much better than I. So I turned that over to her. Then there were the scores of young men who wanted to know what books to read in order to learn as much as Commander Byrd. Miss Buttonoff knows them all, including a few that Byrd overlooked, among them some by Ben Hecht and James Branch Cabell. So I hurled that duty at her nicely-coiffured head. Then there were the youths desiring positions in aviation. Those also I hurled at Miss Buttonoff. "Deal thou with them," I said, "lest I give vent to my natural feelings and go insane."

So, being very busy, I turn some of my letters over to Miss Buttonoff—those that she can answer. But here was one that she couldn't, so she sent it on to me and I answered it myself, as I always do with those that come out from under the standard rules that she can deal with—like jobs, or information, or selling stories about trips to the moon. It chanced that this reader, who had written to me before and had received a reply, wrote again and received one apparently signed by me as "your old friend"—which I was not, by any means. I recognized my talented secretary's writing at once—and so did the reader, apparently, for this is what she wrote:

—

"Dear Cy:

"That last letter that came from your office was neither written, dictated, nor signed by you. In fact, I'd be willing to bet an airplane ride that you were not even in town when it was written. Here's the signature. Say, boy, you couldn't write that nicely if you tried! I mean the penmanship. As for the rest of the letter, anybody with half an eye could tell that it did not come from you. Now, corresponding with Uncle Cy gives little Alice quite a kick—but I wouldn't give a rotten shock-absorber to correspond with Cy's stenographer—who is probably a woman, anyway. But he, she or it who wrote gave me a slight peeve, for their brand of sarcasm was not up to Cy's classical sarcasm, by a long shot. F'r instance, may be my MSS *are* terrible—most of 'em are, I admit—but two of them have already been accepted by another magazine. So there, and there, and there!!! The road to authorship is a long, hard one to travel, especially when one has to work eight hours a day in an office at uncongenial work, and can only pound out a few words at a time at the end of a long day. Well, there's always hope. . . .

Sincerely,

"Alice."

(*Continued on next page*)

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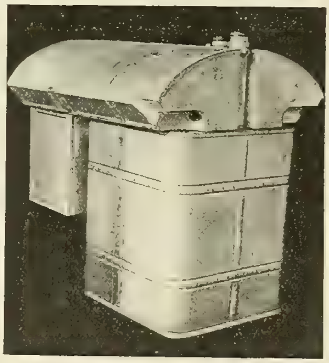

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(Continued from preceding page)

Well, Miss Buttonoff sent that along to me, having given up fooling the child. So I sat down, tired and all as I was from flying from San Antonio, Texas, to Cleveland, Ohio, in twelve hours. And I wrote her a long letter—longer than I should have, at my age—and I hope she forgives me for trying to fool her. I guess I'll have to ask Miss Buttonoff to answer the boys' letters and send the girls' on to me. I like to get them, anyhow. In fact, I like to get all of them. I do get them all, whether I answer them, or whether my secretary does. If she hasn't covered the questions fully, I add a line myself.

You know, half the fun of this fool writing game is to get those letters from readers, that I have just been complaining about. I like them—and if I wasn't rushed off my feet I'd answer every one personally. It's simply a physical impossibility to answer all, but I do the best I can. One from a Captain in the Navy I did answer myself. He wrote, ferociously, that I had no license to criticize my superiors, whose boots, he said, I was unfit to polish. He said, furthermore, that he considered me a weasel.

I replied: "Dear Captain: Whether or not I am fit to polish officers' boots is not for you to decide. However, since I and the other taxpayers help to pay for the polish, we may be pardoned for inquiring if the gentlemen who wear the boots are worth even the cost of the polish. May I present you with a photograph of myself as you see me?"

I enclosed the picture of a weasel and signed it,

"Yours sincerely, *Cy Caldwell.*

TRAINING AIR CORPS RESERVES

(Continued from page 54)

to do this at any time.

Nothing would be more to the liking of the Air Corps than to have enough planes to equip every "Reserve airdrome" and every Regular organization with a full quota of the service type and then qualify every one of its 1,500 active flying Reserve officers in Group I.

At this time of writing there are at Mitchel Field just sixteen service type planes. Eight of these are due for periodical overhaul at the nearest repair depot. This leaves eight service type planes for Regular Army pilots at this station.

The situation at this same station, during the past summer, was not quite as acute. During July and August of 1929 the following flying by Reserve officers in their training, and by Regular Army officers flying on missions in coöperation with other branches of the Army was accomplished:

	Coöperation Other Branches		Reserve Training			
	Service Type Planes		*Service Planes*		*Training Planes*	
	Hrs.	*Mins.*	*Hrs.*	*Mins.*	*Hrs.*	*Mins.*
July	237	45	84	45	182	30
August	153	25	49	15	116	10

More than 110 hours of the July time spent in missions in coöperation with other branches of the Army was spent on maneuvers with the First Division at Camp Dix, N. J.

Not only Air Corps Reserve officers, but the Reserve officers of other branches, find that July and August are the months on which they are assigned to active duty tours. Military aviation is a new thing with the Reserves of many other branches. The Air Corps, then, is charged somewhat with a contribution toward the full and complete education in up-to-date military tactics of the Reserve, and the

(Continued on next page)

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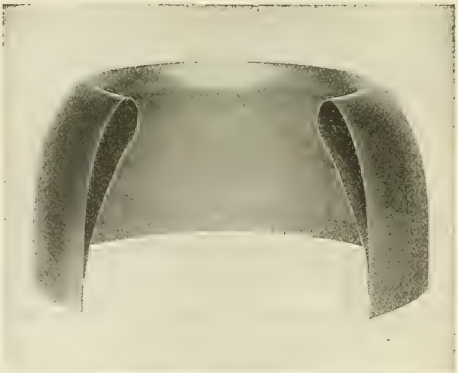

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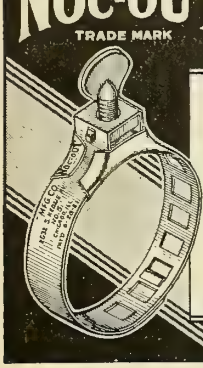

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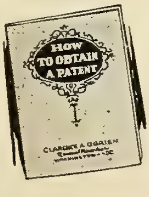
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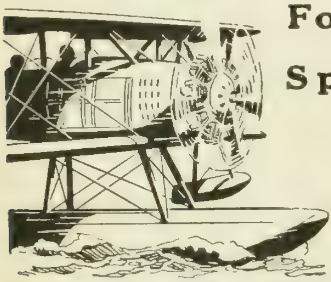

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(Continued from preceding page)

Regular officers as well, of other branches.

Naturally, we should like to see our own Reserve officers get the maximum amount of training in their own arm. We believe we have given them as much as we can, considering the number of planes we have in the Air Corps for all purposes. The practicability of establishing more "Reserve airdromes," such as we already have at Norton or Clover Fields, has been investigated. We have been repeatedly urged, from many sources, to establish such airdromes. To do so at this time is out of the question. With many observation squardons at Regular Air Corps stations having five or less planes allotted them, it would be impossible for us to divert any planes from this source to equip new Reserve stations. There is no other source from which we could obtain service type planes for this purpose. In addition, it has been found that the establishment and operation of a "Reserve airdrome" is a costly proposition when applied against the number of Reserve officers trained there and the flying hours completed by them.

We believe that next summer, with the receipt in the near future of our new two-place service type planes, there will be more flying by Reserve Corps pilots and that the annual forty-eight hours flying time allotment to each of them will be materially increased. In nearly all cases we shall have enough Regular officers available to look after the matter of Reserve Corps training and to give it their undivided attention, for at practically all posts we should have enough pilots to carry on the work requested by other branches of the service.

As to the funds, and hence flying hours available, the following tables show those for the past fiscal year and what we hope to accomplish for the current one:

	Operations	*Flying Hours*
Fiscal year 1929	$814,983.36	*21,307:25
Fiscal year 1930	775,741.00	22,270:00

**Marked economy in aircraft operation and maintenance throughout the Air Corps has made possible the reduction of flying-hour costs for the Fiscal Year 1930; thus allowing more flying hours for less money for this year.*

Do not think that 22,270 hours were all we requested. Our original estimate called for 48,000 hours. As I have previously stated, funds for any purpose are not limitless. What we were finally allowed was 22,270 hours, or translated for the purpose of appropriation, $775,741.

Tentatively, and reserving 2,270 hours for emergency allotment, the following allowances of flying hours were made to the Corps Areas for 1930: First Corps Area, 1,300 hours; Second Corps Area, 1,405 hours; Third Corps Area, 2,300 hours; Fourth Corps Area, 1,000 hours; Fifth Corps Area, 2,900 hours; Sixth Corps Area, 1,600 hours; Seventh Corps Area, 2,100 hours; Eighth Corps Area, 2,595 hours; Ninth Corps Area, 4,600 hours; Hawaii Department, 100 hours; Panama Department, 100 hours.

This includes flying time in both service and training type planes.

Admittedly, the number of flying hours—22,270—seems large, but is pitifully inadequate when divided by those Reserve Corps fliers who will participate in this training.

That, however, is but one of the problems of the Air Corps. Were we to have four times the number of airplanes we now have, it would just keep us up to our hoped-for schedule of work in connection with other branches of the Army, other services of the Government, and what is very important, the continued training of our own pilots and observers. In the end, the Regular, as well as the Reserve officer, needs training the year around.

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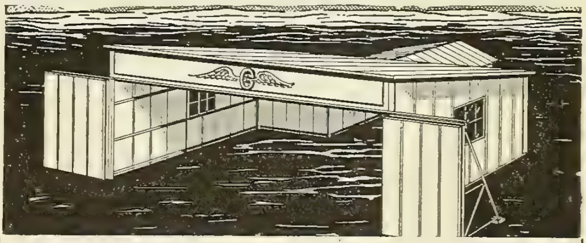

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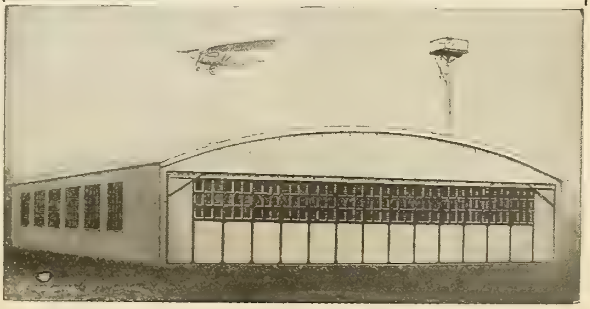

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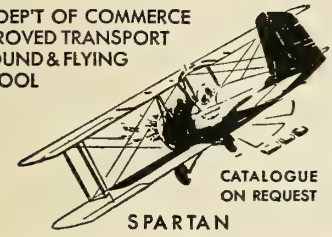

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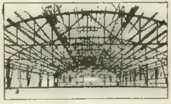

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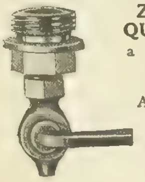

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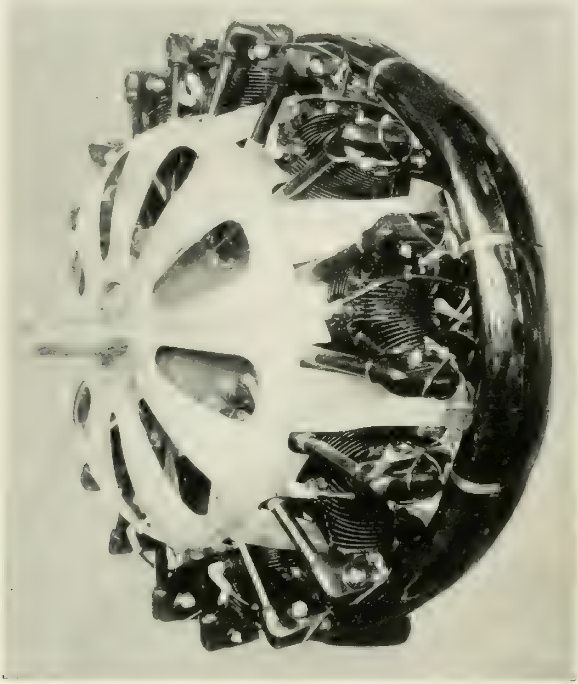
NEW COWLING

and MANIFOLD for WASP JUNIOR



A new exhaust collector, nose cowling and pre-heater combination is now ready for use on the "Wasp Junior" 300 H. P. engine, insuring proper engine operation under all weather conditions.

All parts of the cowling and collector are accessible, and engine and accessories may readily be reached. Individual parts may be replaced without disturbing the unit as a whole. Further, the cowling is so constructed that the airplane designer is completely unhampered in providing for its use.

The collector ring is mounted on the rear of the engine. It is elliptical in section and carries a single outlet delivering exhaust gases either to a tail pipe or directly to the atmosphere. Due to adequate ribbing and solid mounting, the cowl is extremely rigid. Shutters are adjustable and a convenient control is provided.

The fairing and hot air stove serve the dual purpose of decreasing engine drag and the provision of ample quantities of heated air for the carburetor under the coldest operating conditions. This new unit has been designed for durability and long service. Materials and workmanship conform to the rigid standards of Pratt & Whitney quality.

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Wasp & Hornet *Engines*

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"THAT FOR YOU ...old wet-blanket!"

"GO AHEAD, clouds. Be damp. Be cold. Blanket the skies with wintry juiciness, if you must. But don't think you'll ground *me!*"...

Yes, indeed—a pilot should worry about discomfort ...as long as he's wearing a Spalding Wet-Weather Suit similar to the one shown at the right.

The outer shell of waterproof Bedford cloth will shed moisture like a ruffling duck. The inner layer of soft wool fleece will shut out the bitterest cold.

And you can just snuggle your neck and chin deep into the warm, electrified lamb fur collar—and shrug your shoulders at the biting blasts.

Like all Spalding Suits, the one-piece, slip-on suit illustrated at the right is designed to permit perfect freedom of movement. Protectively warm as it is—it is *not* bulky. And five hookless fasteners allow you to put it on or take it off, in short order.

Trim, good-looking, made for long hard wear, this fine suit is one of the most popular ever made by Spalding. Priced fairly, at $65.

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A. G. Spalding & Bros.

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EQUIPMENT

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105 Nassau Street, New York City
Please send free Aviation Catalog

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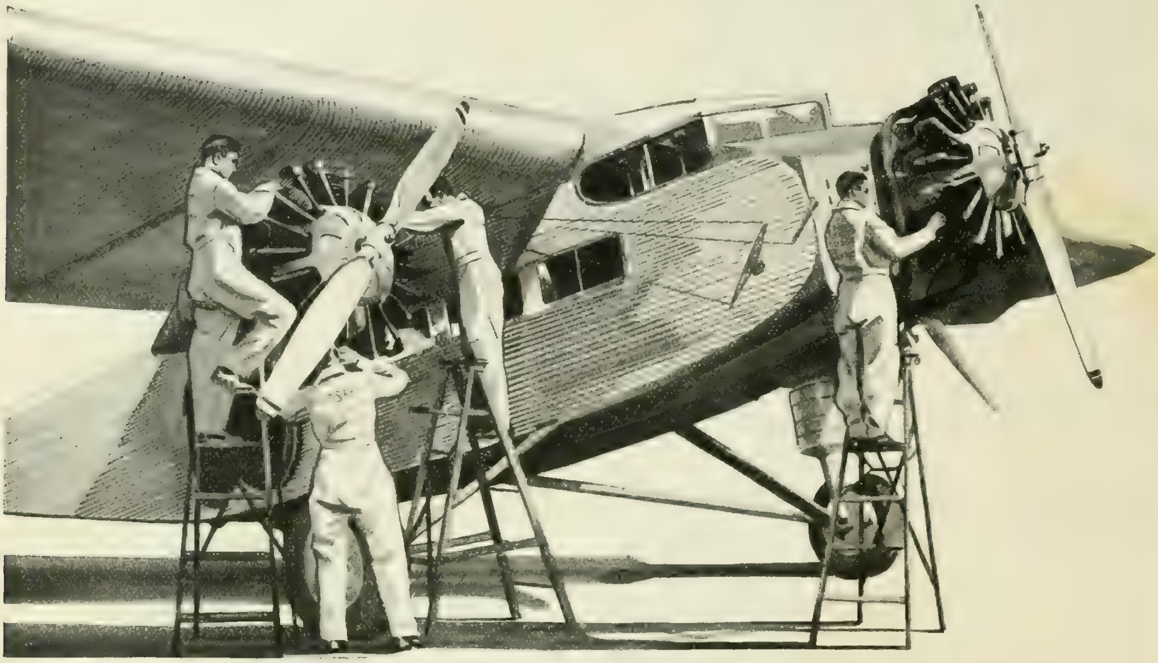
And now , , , , , Tri-



MAKING it easier for many pilots to realize an ambition... preparing them to fly tri-motor planes... giving transport lines a dependable source from which to obtain experienced pilots—these advantages are now available at the Spartan School of Aeronautics.

By special arrangement with the Southwest Air Fast Express, Spartan now offers a complete course of training in tri-motor planes including flying and mechanical instruction, and lectures covering theoretical and technical subjects.

In this new advanced transport course the Spartan student receives instruction in take-offs, stalls, recoveries, cross-wind landings, banks up to 90 degrees, wing-overs, and tight vertical spirals. In addition he receives extensive ground school work not included in standard transport courses.

The Spartan advanced transport course has three outstanding ad-

Motor Training , , , ,

at America's finest aviation school

vantages over any other tri-motor course:

(1) Flight instruction, shop and lecture courses are supervised by air line executives who are among America's most experienced pilots of tri-motor planes. (2) The student may observe methods employed by the Southwest Air Fast Express which operates fourteen tri-motor Fords with Tulsa as its base. (3) The student is thoroughly instructed in fundamental air line business principles—traffic and operations—at the actual executive headquarters of a great air transport system.

Students in the advanced transport course (as in other Spartan courses) may take advantage of a liberal extended tuition payment plan. For complete information mail the coupon below.

A Safeway Ford in flight above the clouds

Advanced mechanics inspecting a Ford tri-motor airplane

Spartan students and Safeway instructors

AMERICA'S FINEST
AVIATION SCHOOL

Approved by the U. S. Department of Commerce as Transport Ground and Flying School

SPARTAN SCHOOL OF AERONAUTICS

TULSA · OKLAHOMA

SPARTAN SCHOOL OF AERONAUTICS, TULSA, OKLAHOMA.

Gentlemen: Please send me your new 1930 illustrated booklet. I am interested in the courses and information checked below:

( ) Advanced Transport
( ) Transport
( ) Limited Commercial
( ) Private
( ) Advanced Mechanics
( ) Mechanics
( ) Welding
( ) Free Air Transportation to Tulsa
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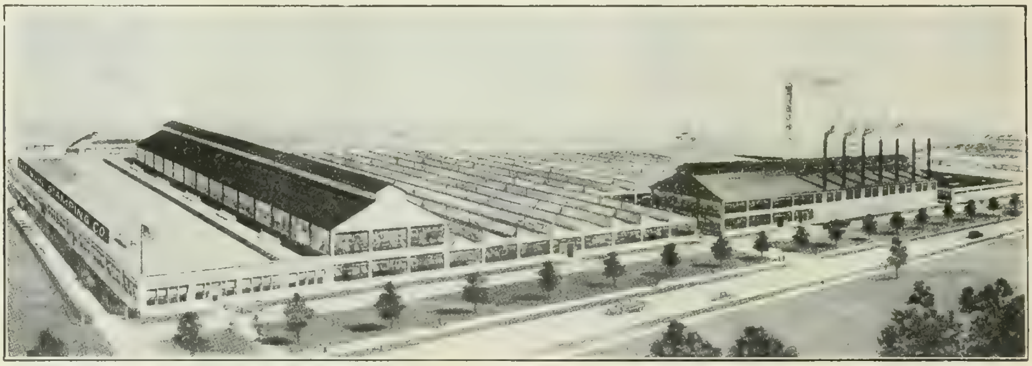
THE BUHL NAME has been identified with progressive industry since 1833. Buhl products today carry far more than the name alone — they preserve the priceless heritage of almost a century of manufacturing leadership and integrity.

Buhl Stamping Company service is more than mere production according to schedule and price. It implies active cooperation between all departments of our own and our customers' plants — from blueprint to finished product. It is a service that is proving of inestimable value to the majority of manufacturers who use metal stampings for aircraft and aircraft engine parts.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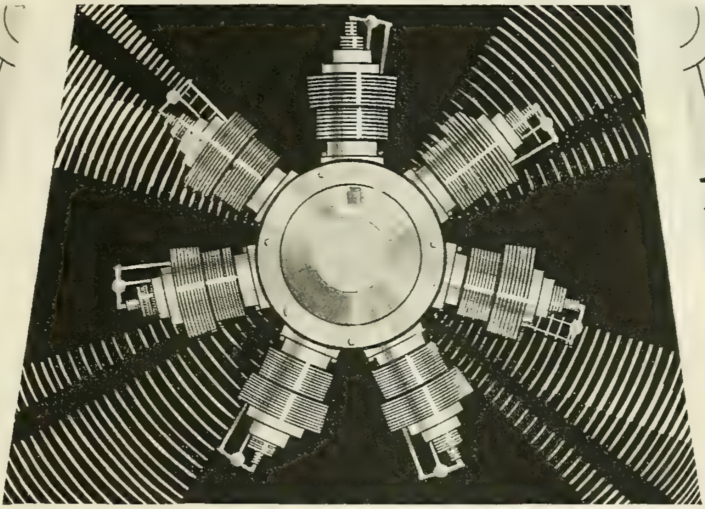
THE ONE METAL THAT FLIES BEST



OR OVER 400 HOURS AN ALCOA ALUMINUM ROPELLER KEPT A CURTISS-ROBIN ALOFT

Droning through the Missouri sky for over 400 hours, the Curtiss-Robin world endurance record-holder was held aloft by an Alcoa Aluminum propeller. More than two weeks of continuous whirling, without a sign of strain, is unique tribute to the fatigue life of Alcoa Aluminum.

In propellers forged of Alcoa Aluminum great strength is combined with extreme lightness. Although the Alloys of Alcoa Aluminum weigh but ⅓ as much as old-fashioned metals, when heat treated they attain a tensile strength equal to many heavy commercial steels—55,000 pounds per square inch minimum.

More than 60 parts for airplanes are now being forged of Alcoa Aluminum. They are highly resistant to corrosion. They are tough. They are easy and cheap to machine. They take a high polish, which often saves expensive plating.

Technical Data Which Gives Definite Proof that Alcoa Aluminum Is the One Metal that Flies Best.

Material	Specific Gravity	Young's Modulus of Elasticity lbs. per sq. in.	Ultimate Tensile strength lbs. per sq. in.	Yield Point lbs. per sq. in.	Fatigue Limit lbs. per sq. in.	Specific Tensile Strength [1]	Specific Yield Limit [1]	Specific Fatigue Limit [1]
Alcoa Aluminum 17ST	2.8	10,000,000	58,000	35,000	15,000	20,710	12,500	5,360
Chrome-molybdenum steel	7.9	30,000,000	100,000	60,000	40,000	12,650	7,600	5,060

[1] The specific tensile strength, specific yield point, and specific fatigue limit are equal to ultimate tensile strength, yield point and fatigue limit divided by the specific gravity.

Our nearest office will gladly send a representative to explain exactly how Alcoa Aluminum can be used to meet your construction problems. He will be a technical man, competent to assist in solving metallurgical problems. ALUMINUM COMPANY of AMERICA; 2484 Oliver Building, PITTSBURGH, PENNSYLVANIA; Offices in 19 Principal American Cities.

ALCOA

ALCOA ALUMINUM

FREE FLYING LESSONS!

—BUY AN AMERICAN EAGLE AT RETAIL AND RECEIVE FLIGHT INSTRUCTIONS FREE . . . . .

AMERICAN EAGLE'S sensational offer still is open. Since its announcement, hundreds of inquiries have been received.

This is the first time an American builder of aircraft has made a move to make it easier for everyone to LEARN TO FLY.

Listed here are American Eagle distributors joining in this program. Write or wire TODAY to any one of these or directly to the company. DO IT NOW!

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Monessen Aero, Corp.,
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Bay State Flying Service,
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Montgomery School of Aeronautics,
Montgomery, Alabama

Gardner Flying Club,
Gardner, Mass.

Southern Airways, Inc.
San Antonio, Texas

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Tuscarawas County Aviation, Inc.,
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Northern Airlines, Inc.,
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Crymble Aircraft Corp.,
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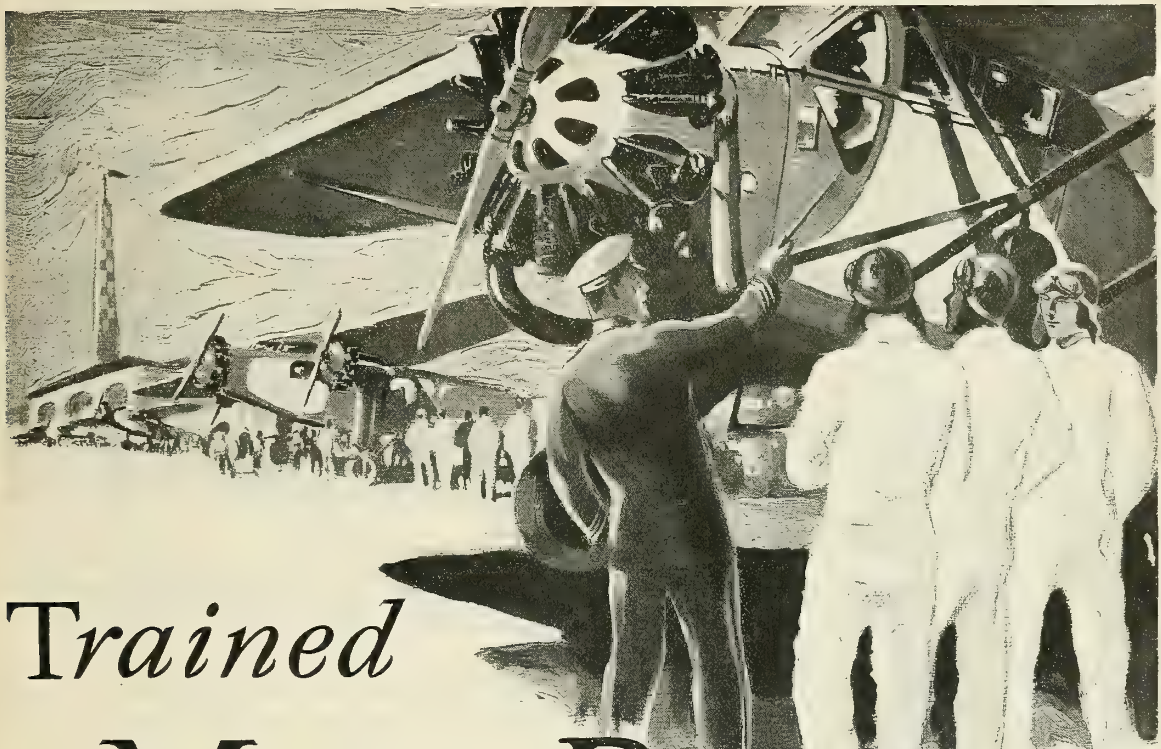
Ravenswood Aeronautical Corp.,
5512 North Western Ave.,
Chicago, Ill.

AMERICAN EAGLE
AIRCRAFT CORPORATION
FAIRFAX AIRPORT KANSAS CITY, KANS.
"MASTER OF THE SKIES"



Trained Man Power

Los Angeles County Has:

55 Airports and landing fields

* * *

17 Airplane factories

* * *

10 Aircraft motor factories

* * *

An average of 355 days per year with sunshine

* * *

An average wind velocity of only 5 MPH

* * *

An average of 274 days per year when the thermometer is neither above 80° nor below 40°.

* * *

Contented Open Shop labor

* * *

Abundant industrial power, natural gas and water, at low rates

* * *

Ideal living conditions

* * *

High working efficiency

* * *

Low building and maintenance costs due to year 'round equable climate

CONCENTRATION of the aircraft industry in Los Angeles County, as the natural result of better flying conditions, has developed here an extensive guild of trained man power, skilled in every branch of aircraft production and operation.

Twenty-six or more aviation schools have an enrollment of over 1800 students in training and are constantly releasing qualified men for service.

Los Angeles County has more licensed pilots than any other county in the United States.

These important factors, supported by natural year 'round climatic advantages, make Los Angeles County the preferred location in all America for the profitable manufacture of aircraft and airplane motors and parts.

Air-Minded

LOS ANGELES COUNTY

Write to Industrial Department, Los Angeles Chamber of Commerce, for interesting facts and figures regarding the aircraft industry and its opportunities in Los Angeles County.

ERRETT WILLIAMS

1st Place, Class D Philadelphia-Cleveland Derby—Winner of six other race events.

"I have experienced no lubrication troubles of any kind since using your products."

J. H. STEWART

2nd Place, Class D Philadelphia-Cleveland Derby

"Express my appreciation of the courteous treatment rendered by your organization and the splendid service received from your products."

HOWARD P. YOUNG

3rd Place, Class D Philadelphia-Cleveland Derby

"I am taking this opportunity to express to your company my great admiration for Kendall Oil."

J. WESLEY SMITH

1st Place, Class F Philadelphia-Cleveland Derby

"During the meet, I did 1640 miles of full throttle racing and not once did I have trouble with my oil. Thanks again to Kendall."

BUY AT THIS SIGN
PENZBEST
KENDALL
MOTOR OILS
IT IS YOUR PROTECTION

East Coast.. It's Kendall

In the Cleveland Races . . . famous pilots are

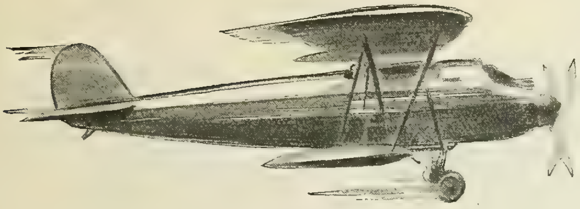
THE National Air Races. Air triumphs that thrilled fortunate onlookers—bring a thrill in their recounting to the reader far away! Aimed lightning swift as a glance of the eye. Headlong energy controlled to a plotted course. Stupendous power turned loose to a definite goal. KENDALL OIL protected those impetuous motors—gave speed to those arrowing planes—proved its eternal mastery of friction—justified the trust of kings of the air.

For when the shouting and tumult had faded, when sturdy motors winged back to home hangars, victorious pilots paused to declare their friendship for aviation's greatest oil. Their letters bore postmarks of coast to coast cities, their words were few or many—but every message held the same straightforward thought: *Kendall assures correct lubrication!*

The statements of these nine pilots, added to those of other National Air Race winners, hold profitable significance to all who follow the airways of the world. When Kendall "makes good" under the severest tests man, plane and motor can provide, how abundantly it will serve in every day aviation use!

BUY AT THIS SIGN
PENZBEST
KENDALL
MOTOR OILS
IT IS YOUR PROTECTION

KENDALL



SIDNEY A. RILEY, JR.
2nd Place, Class F
Philadelphia-Cleveland Derby

"Running my motor almost constantly at full throttle and at unusually high temperatures, I found that Kendall "J", as usual, gave perfect lubrication."

West Coast "All Around"

Kendall Oil proved its worth "one" in its praise

Every drop of KENDALL OIL comes from the Bradford Grade of Pennsylvania Crude—acknowledged as the world's finest. The most modern scientific methods are used in its refining. It is untouched by acids or other harmful agencies. Every step of the process is supervised by expert refining engineers and chemists to ensure a wax-free, uniform product. These are reasons why KENDALL OIL gives better lubrication—retaining its full-bodied protection under extremes of heat and friction, yet circulating freely under conditions of intense cold. It has been consistently demonstrated that KENDALL OIL keeps its splendid lubricating qualities for thirty hours or more of flying—merely maintain the required oil level.

Write for a list of airports where Kendall is now obtainable and complete information about this remarkable Pennsylvania Lubricating Oil. If you are unable to secure KENDALL OIL in your vicinity, a letter with the name of your airport will receive our full cooperation. Address Kendall Refining Company, Bradford, Pa.

R. P. HEWITT
3rd Place, Class F
Philadelphia-Cleveland Derby

"Every single plane to finish was using Kendall Oil, which is, in my opinion, the highest testimonial anyone could give."

LOREN W. MENDALL
1st Place
Oakland-Cleveland Derby
3rd Place
Rim of Ohio Derby

"I can unreservedly say that I think your oil is the finest quality possible for airplane use."

W. JOE BARROWS
2nd Place
Oakland-Cleveland Derby
2nd Place
Rim of Ohio Derby

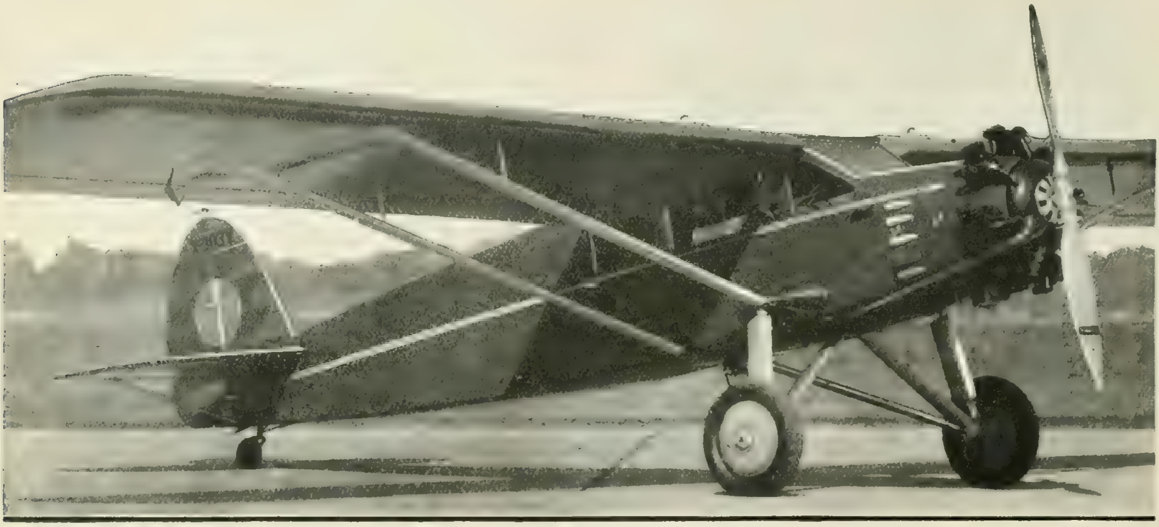
"Your oil and your service is a combination which should not be overlooked by any pilot."

J. O. DONALDSON
3rd Place
Oakland-Cleveland Derby

"Needless to say in the Cleveland Races I insisted on Kendall, regardless of the various oils offered."

OIL

REFINED FROM 100%
BRADFORD GRADE OF
PENNSYLVANIA CRUDE



U. S. Department of Commerce Approved Type Certificate No. 267

Beautiful, Rich, Luxurious . . . Acclaimed

An Engineering Masterpiece

To see the Verville . . . to ride in its luxuriously upholstered, richly appointed cabin, is to experience a realization that the finer type of aircraft today is safe, comfortable and convenient in every respect . . . that the aviation industry has passed from the experimental stage to one of sound, safe engineering standards. Verville, with fifteen years' designing experience—both in military and commercial aircraft, offers to discriminating buyers the Verville limousine of the air . . . a closed plane, for four, exceeding by far anything that has yet been produced for those who appreciate that which is really fine. Demonstrations by appointment only. Booklet on request.

VERVILLE AIRCRAFT COMPANY
DETROIT, MICHIGAN

Verville

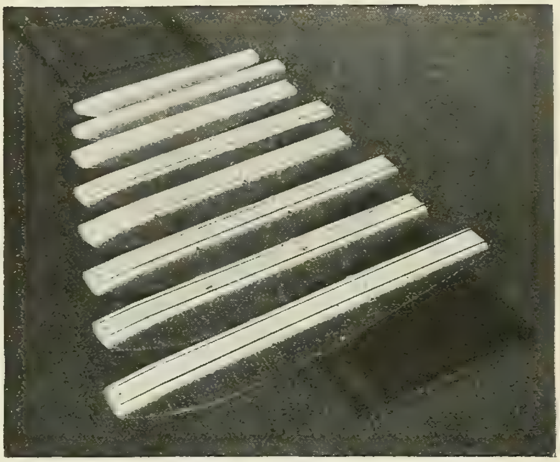
FINER AIRCRAFT

VERVILLE

SPRING — SUMMER — SEAPLANES

EDO

FLOATS ARE READY NOW!



8 of the 11 standardized models

EDO greets the greatest seaplane year with the largest and most complete stock of floats in EDO history.

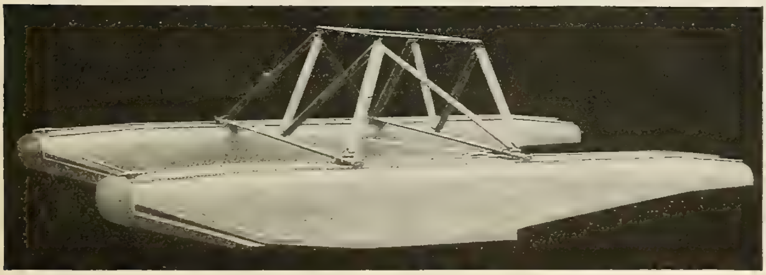
With the spring season so near at hand, airplane manufacturers, distributors and transport operators are turning their attention to the additional sales and greater range of service which EDO Floats make possible. In view of the tremendous and growing demand for floats, the advantages of this preparedness are obvious.

Standardized in 11 models for the conversion of more than 40 distinct types of landplanes up to 8,250 lbs. gross weight, EDO Floats fully comply with U. S. Department of Commerce regulations. They can be quickly interchanged with standard types of wheel landing gear. The close cooperation between EDO designers and the engineering staffs of most airplane manufacturers assures correct and efficient design with the added durability of EDO craftsmanship.

Other manufacturers who seek a wider sales outlet for their aircraft are invited to make use of EDO experience and ability—to build profits through the EDO Sales Plan which assures complete protection. There is still ample time to enter the 1930 market with a float installation designed by EDO particularly for your machine.

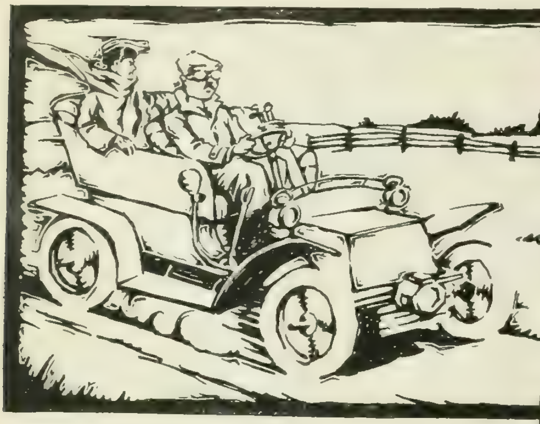
NOW is the time to place an order for the 1930 season, for even your estimated maximum requirement may fall far short of actual demands. Delays of peak season production are avoided and 'ready-to-install' is a sales point that will surely put profits at your command. For information address EDO AIRCRAFT CORPORATION, 610 Second Street, College Point, L. I., N. Y.

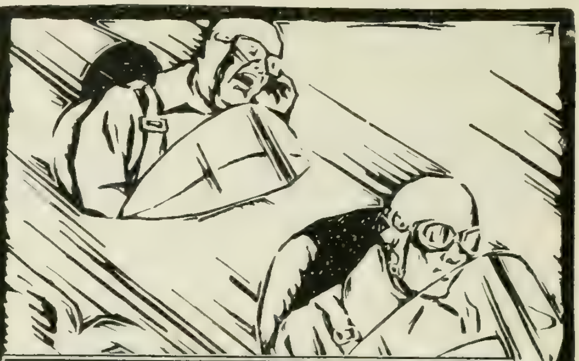
A typical EDO Float installation —quickly interchangeable with wheel landing gear



EDO

THE FLOAT MAKERS





When You're Flying for *Pleasure*—

Sit Side-by-Side in an Inland Sport!

COMPARING pioneer automobiles with today's cars, an outstanding difference is the degree of *comfort* afforded driver and passenger. Similarly, the Inland Sport brings greater comfort and pleasure to flying. The side-by-side seating arrangement in a roomy cockpit makes the Inland Sport "tomorrow's plane today."

Pilot and passenger in an Inland Sport can talk face-to-face, even while flying at high speed. They can discuss their maps, consult one another about landmarks, point out the "sights" en route, converse as they would in a motor car. Sport flying thus becomes as pleasant, as chummy and as intimate as motoring in a sleek sport roadster—*plus* all the thrills of the air!

The Inland Sport is built for air-minded sportsmen . . . for you ex-service flyers who still hanker for the feel of a stick . . . for use by owner-pilots in business . . . and for schools. This high-wing, two-seater ship is the ideal training 'plane because of its side-by-side seating arrangement.

Sturdily built, the Inland Sport has the strength and ruggedness to withstand hard usage. It is economical to own . . . economical to operate. Powered with a LeBlond 60 or Warner Scarab engine, this small, low-price sport 'plane has few equals in refinement of design, beauty of line and color, performance and reliability.

Further details gladly sent on request.

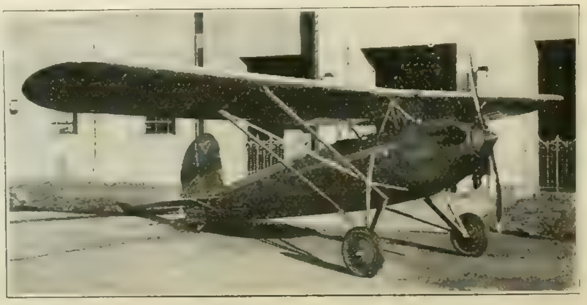
INLAND SPORT
KANSAS CITY

INLAND AVIATION
COMPANY

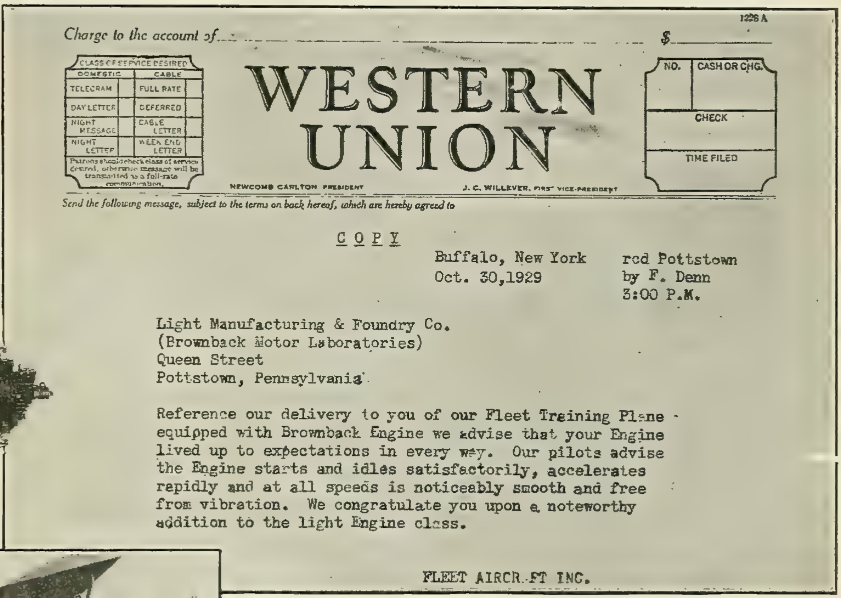
Fairfax Field
KANSAS CITY, KAN.

INLAND SPORT
MONOPLANE
"TOMORROW'S PLANE TODAY"

Manufactured at Fairfax Field under Approved Type Certificate No. 259



You can't expect an aircraft engine to perform on a magazine page . . . . but PERFORMANCE in the air is PROOF



1226 A

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CLASS OF SERVICE DESIRED	
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Patrons should check class of service desired, otherwise message will be transmitted as a full-rate communication.

WESTERN UNION

NEWCOMB CARLTON PRESIDENT J. C. WILLEVER, FIRST VICE-PRESIDENT

NO.	CASH OR CHG.
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Send the following message, subject to the terms on back hereof, which are hereby agreed to

C O P Y

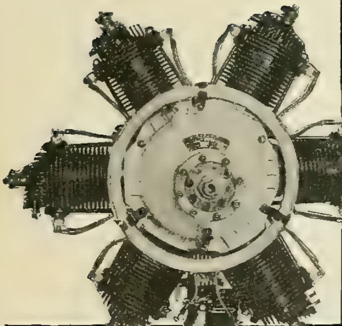
Buffalo, New York
Oct. 30,1929

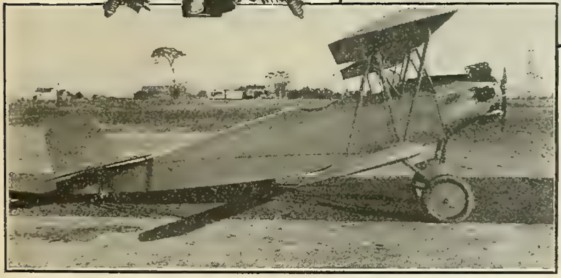
rcd Pottstown
by F. Denn
3:00 P.M.

Light Manufacturing & Foundry Co.
(Brownback Motor Laboratories)
Queen Street
Pottstown, Pennsylvania

Reference our delivery to you of our Fleet Training Plane equipped with Brownback Engine we advise that your Engine lived up to expectations in every way. Our pilots advise the Engine starts and idles satisfactorily, accelerates repidly and at all speeds is noticeably smooth and free from vibration. We congratulate you upon a noteworthy addition to the light Engine class.

FLEET AIRCRAFT INC.





YOU can't power a plane with pretty pictures and many cylinder adjectives. No matter how much we promise of smooth, vibrationless power at lower cost, these promises must be redeemed in the air . . . else we are idly tinkling a cymbal. That is why you will be interested in this telegram which was sent by Fleet Aircraft, Inc., after their installation and test of the TIGER—Brownback C400.

Because of its correct design and sturdy construction the TIGER Aircraft Engine provides 90 horsepower at an extremely low r. p. m.—at a weight of less than THREE POUNDS PER HORSEPOWER. Its amazingly simple design reduces the cost of upkeep and service. A particularly successful engine for training planes.

We will be glad to arrange a demonstration of the TIGER **IN THE AIR,** or we will send descriptive literature including complete specifications on request. Aeronautical Division, **LIGHT MANUFACTURING & FOUNDRY CO.,** POTTSTOWN, PA.

SMOOTH, VIBRATIONLESS POWER

Brownback
C400

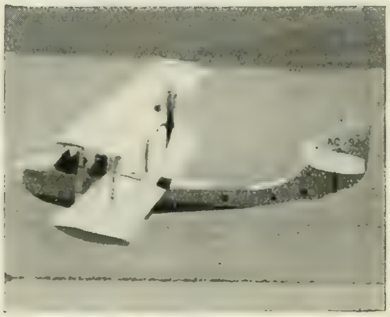
TIGER

DEPARTMENT OF COMMERCE APPROVED TYPE CERTIFICATE No. 33

[For further particulars write to 89 Shelton Ave., New Haven, Conn. —or to Causeway Island, Miami.]

THE VIKING FLYING BOAT

Stability: Ratio of the wing span of 42 ft. and area of 448 sq. ft. with tail length and areas of stabilizer and control surfaces, give the Viking exceptional maneuverability and stable flying characteristics.



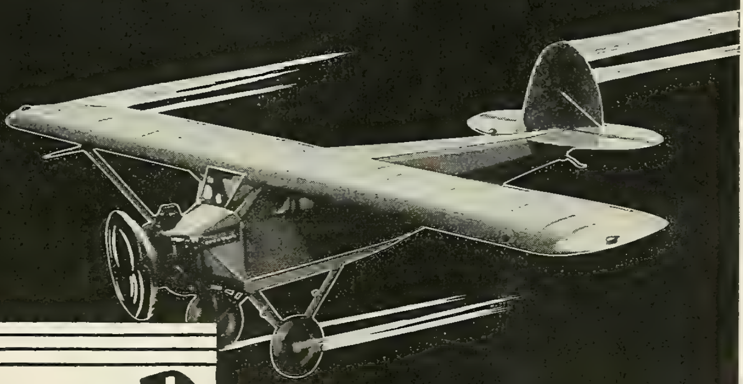
Safe Qualities: To its pusher propeller and the long graceful swing to the tail is due much of the ease with which the Viking handles in the air and on the water.

Climb: Out of the water in from ten to fifteen seconds, the Viking climbs willingly at a rate of 600 ft. per minute.

Comfort: The Viking seats four comfortably. The pusher type propeller is well behind enabling you to get in and out of the cockpit with ease—to land on beaches, to moor to docks or yachts.

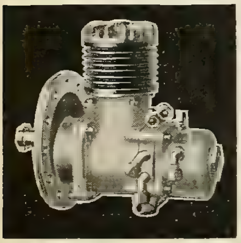
Design: The Viking was designed by Louis Schreck—it is manufactured at 89 Shelton Ave., New Haven, Conn. by The Viking Flying Boat Company.

The WALLACE TOUROPLANE



Standardizes on HEYWOOD STARTER

START-ER by HEYWOOD



The famous Wallace Touroplane, a three place folding wing cabin monoplane, built by the Wallace Aircraft Company, a division of the American Eagle Aircraft Corporation, comes equipped with the Heywood Starter.

This manufacturer like many others has chosen the Heywood because of its consistent dependability under all operating and climatic conditions.

The Heywood Injection Starter is simple in design—dependable in operation. Now considered an indispensable safety factor, and so featured by many aircraft manufacturers.

If you desire a starter on your ship that will make each start instantaneous, that starter should be a Heywood.

Complete details on request

SKY SPECIALTIES CORPORATION
3651 Hart Avenue - - Detroit, Michigan

RECOGNITION

Here is a partial list of manufacturers using Stromberg Carburetors as standard equipment:

AIRCRAFT

Air Craft Engine Corp.
Allison Engineering Co.
American Cirrus Eng. Co.
Axelson Machine Co.
Comet Engine Corp.
Continental Motors Corp.
Curtiss Aero & Motor Co.
Fairchild Eng. Corp.
Kinner Airplane & Motor Corp.
Lambert Aircraft Co.
(formerly Velie Motors Corp.)
LeBlond Aircraft Engine Co.
Lycoming Motor
MacClatchie Manufacturing Co.
Menasco Motors, Inc.
Michigan Aero. Engine Corp.
Navy Department
Pratt & Whitney Aircraft
War Dept.—Air Corps
Warner Aircraft Corp.
Wright Aero Corp.

AUTOMOBILES

Chrysler Corp.
Continental Motors Corp.
Dodge Bros. Corp.
Durant Motor Co.
(Lincoln) Ford Motor Company
H. H. Franklin Mfg. Co.
Hupp Motor Car Corp.
Jordan Motor Car Co.
Locomobile Co. of America, Inc.
Marmon Motor Car Co.
Peerless Motor Car Co.
Pierce-Arrow Company
The Studebaker Corp.
Windsor Corporation

MARINE

Consolidated Ship Bldg.
Sterling Engine Co.

TRUCKS, TRACTORS, ETC.

The Autocar Company
A. D. Baker Co.
Brockway Truck Co.
Buda Co.
Buffalo Springfield Roller Co.
Climax Engineering Co.
The Four Wheel Drive Auto Co.
Fate Root Heath Co.
Hercules Motor Corp.
Indiana Truck Corp.
International Motor Co.
International Harvester Co.
Le Roi Company
Lima Locomotive Works
Maccar Truck Co.
Minneapolis Motive Power Implement Co.
Northwest Engineering Co.
Rock Island Plow Co.
Sayers Scoville Co.
Stewart Motor Corp.
Waukesha Motor Co.
Wisconsin Motor Co.

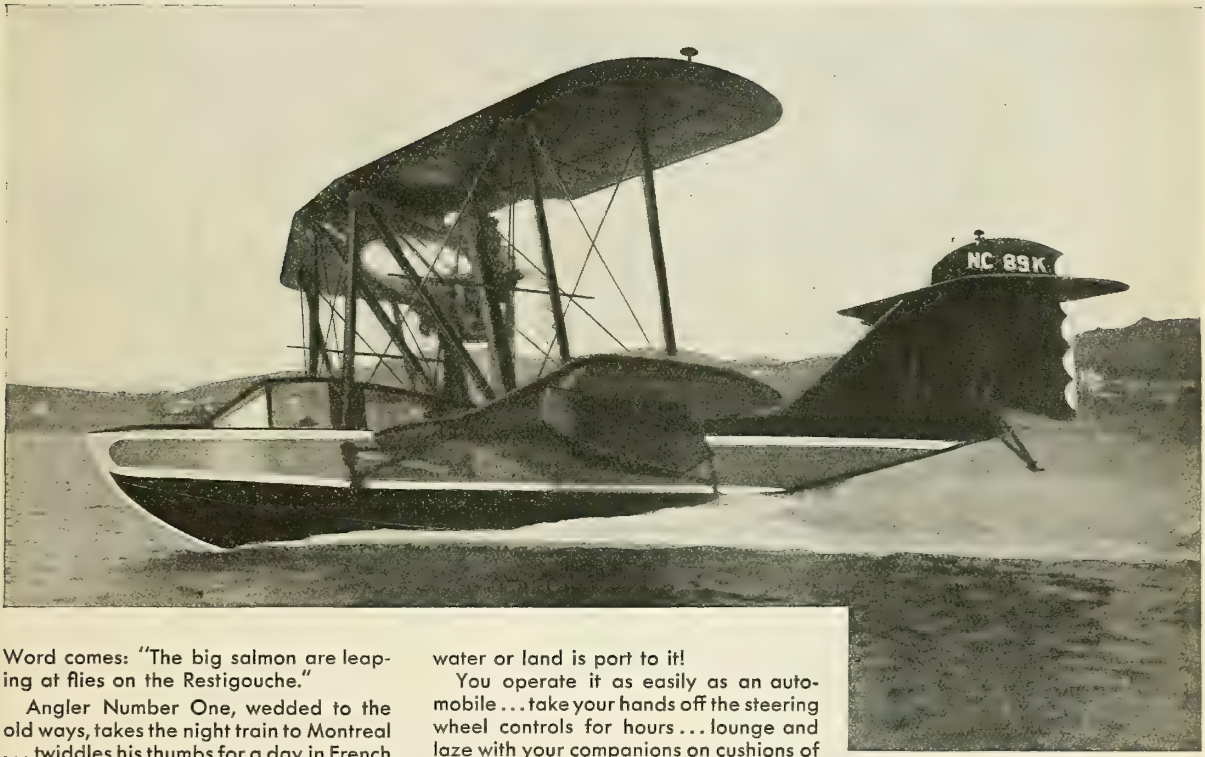
135 manufacturers use Stromberg carburetors as standard equipment. This impressive list, shown here, contains representative firms in every line of industry where motors are used.

These firms KNOW that Stromberg superior performance is the result of the highest type of carburetion engineering, the finest workmanship, the best materials procurable.

They recognize real merit and are willing to pay for it.

STROMBERG MOTOR DEVICES CO., 58-68 E. 25th Street, CHICAGO

Two Anglers go to the Restigouche!



Word comes: "The big salmon are leaping at flies on the Restigouche."

Angler Number One, wedded to the old ways, takes the night train to Montreal . . . twiddles his thumbs for a day in French Canada . . . swings aboard a creaking train a second night and in mid forenoon arrives within two leagues of pools and "white water"—yea, verily, a martyr to rod and reel!

Angler Number Two, a disciple of the theory that the old ways are not the new ways, motors serenely to Roosevelt Field . . . climbs into his palatial IRELAND Amphibion . . . taxies to the runway on wheels of air . . . takes off in 6 seconds exactly at 11 a. m. . . . and swings northeast to the angler's land of enchantment.

About 6 p. m. he swoops down into the mirror of a Canadian bay . . . rides to the Salmon Club . . . smokes a pipe that night under a canopy of stars . . . and next morning rebounds to the z-z-z-z-z of the screaming reel . . . while his companion dozes in Montreal!

Miles melt to yards . . . hours shrink to minutes . . . when your transportation is the peerless IRELAND.

Amphibion, it soars as lightly from land as from water; while the air-minded call for more airports the IRELAND smiles. Four-fifths of the earth is water . . . and water or land is port to it!

You operate it as easily as an automobile . . . take your hands off the steering wheel controls for hours . . . lounge and laze with your companions on cushions of comfort . . . while its dependable Pratt-Whitney Wasp wings you through space at 120 miles an hour.

Your motor is amidship . . . can't interfere with your hoisting of the anchor, can't endanger those boarding or leaving, softens the hum and allows unobscured forward vision. Your boat hull is riveted duraluminum . . . so are your pontoons . . . and, consequently, as oblivious to a hard water landing as battleship plate.

If you have said "I want safe air transportation" here it is . . . the sum total of modern achievement . . . the IRELAND Amphibion. For demonstration, literature, etc., write: Ireland Aircraft, Inc., Garden City, Long Island, New York.

PERTINENT FACTS ON THE IRELAND

Performance with Full Load
Guaranteed Within 5%

High Speed	120 M.P.H.
Cruising	105 M.P.H.
Landing	48 M.P.H.
Climb	950 F.P.M.
Take-off from Water	18 Sec.
Range	450 Miles
Ceiling, Service	14,000 Feet

SPECIFICATIONS

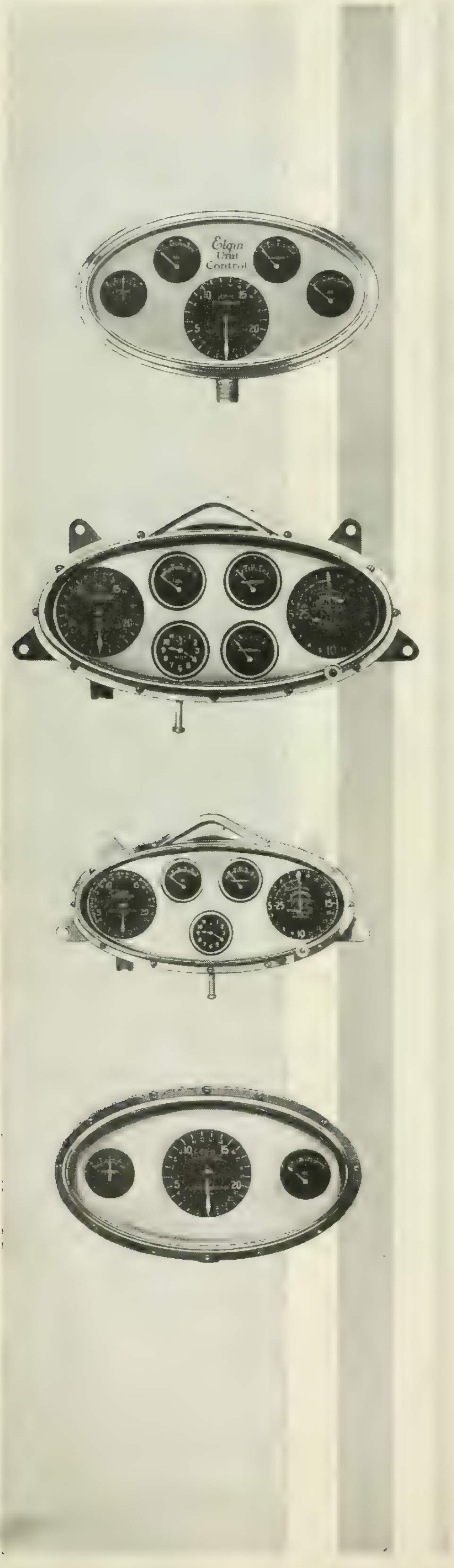
Engine—Pratt and Whitney Wasp	425 H. P.
Length Overall	31 Feet
Span Upper Wing	40 Feet
Span Lower Wing	34 Feet
Chord	5 Ft. 6 In.
Propeller	Standard Steel
Capacity	Five Persons
Price—Flyaway at Factory	$27,500

Completely equipped with Anchor, Navigation Lights, Electric Starter, etc.

TO DEALERS: *The Ireland provides an exceptionally attractive proposition for men of vision. We have severed connections with a national sales agency and will consider applications for territorial representation.*

IRELAND

FIVE PLACE AMPHIBION



AVIGO
ELGIN

UNIT CONTROL

One glance at your **ELGIN** Unit Control Board and you know exactly how your power plant is functioning. No squinting into dark corners. No acrobatic twisting to learn what your engine is doing. It's handsome, reliable, accurate . . . and not expensive. Why not date your instrument board 1929?

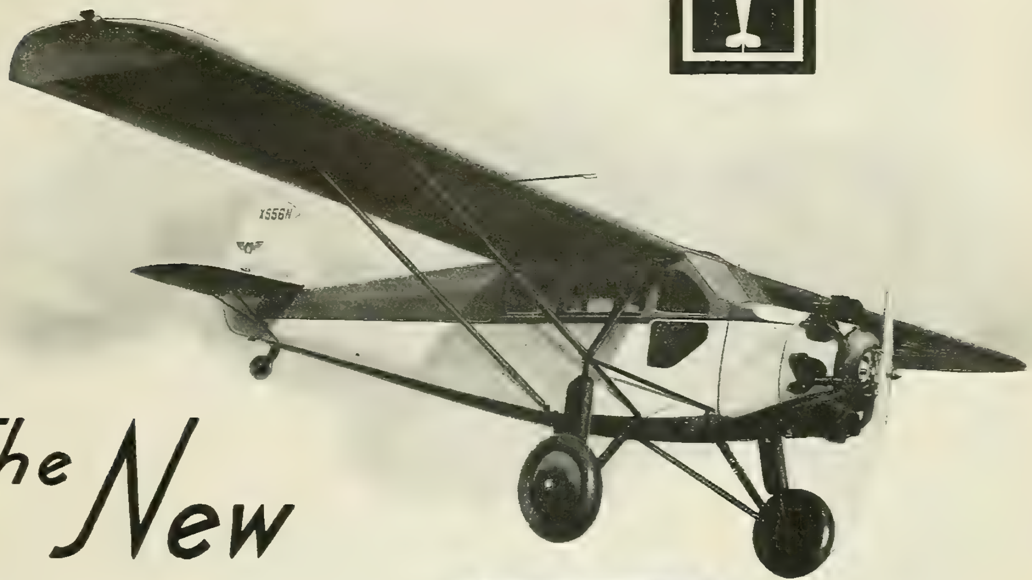
AIRCRAFT INSTRUMENT DIVISION

ELGIN NATIONAL WATCH COMPANY

ELGIN ILLINOIS

Central Distributors:
Johnson Airplane & Supply Co., Dayton, Ohio

BUILDERS OF LINDBERGH'S RYAN "SPIRIT OF ST. LOUIS"



The New RYAN FOURSOME

The comfortable cabin of the Foursome reflects in every detail the new luxury which Ryan has introduced to air travel.

THE ROOMIEST, MOST LUXURIOUS, 4-PLACE CABIN PLANE EVER OFFERED

In the Foursome, Ryan presents a de luxe 4-place ship that sets a new standard for light cabin monoplanes. Exceptionally roomy and luxuriously appointed, the new model C-1 offers the latest features in aeronautical design together with characteristic Ryan performance.

The cabin of the new Ryan Foursome is finished as completely and as artistically as the interior of a custom motor car. The automobile-type fittings, the rich upholstery and roomy seats—one of which is convertible into a lounge—provide a new degree of luxury in air travel.

A host of new improvements are incorporated in the Foursome. A 2-piece wing which gives greater stability—a stabilizer adjustment which permits extra-fine settings—direct connected push-pull type elevator controls and pedal rudder controls—are a few of the many advanced construction features.

Powered by a 225 Horsepower Wright Whirlwind Engine, the new Ryan Foursome has a top speed of 130 miles per hour and cruises at 110. With full load—1300 pounds—it has a range of 625 miles. And in take-off and climb it maintains the brilliant reputation established by Ryan planes.

$9,985
Flyaway, St. Louis

Ideally designed for private pilots the new Ryan Foursome is equally suitable for commercial purposes. Specifications and complete performance data will gladly be sent upon request.

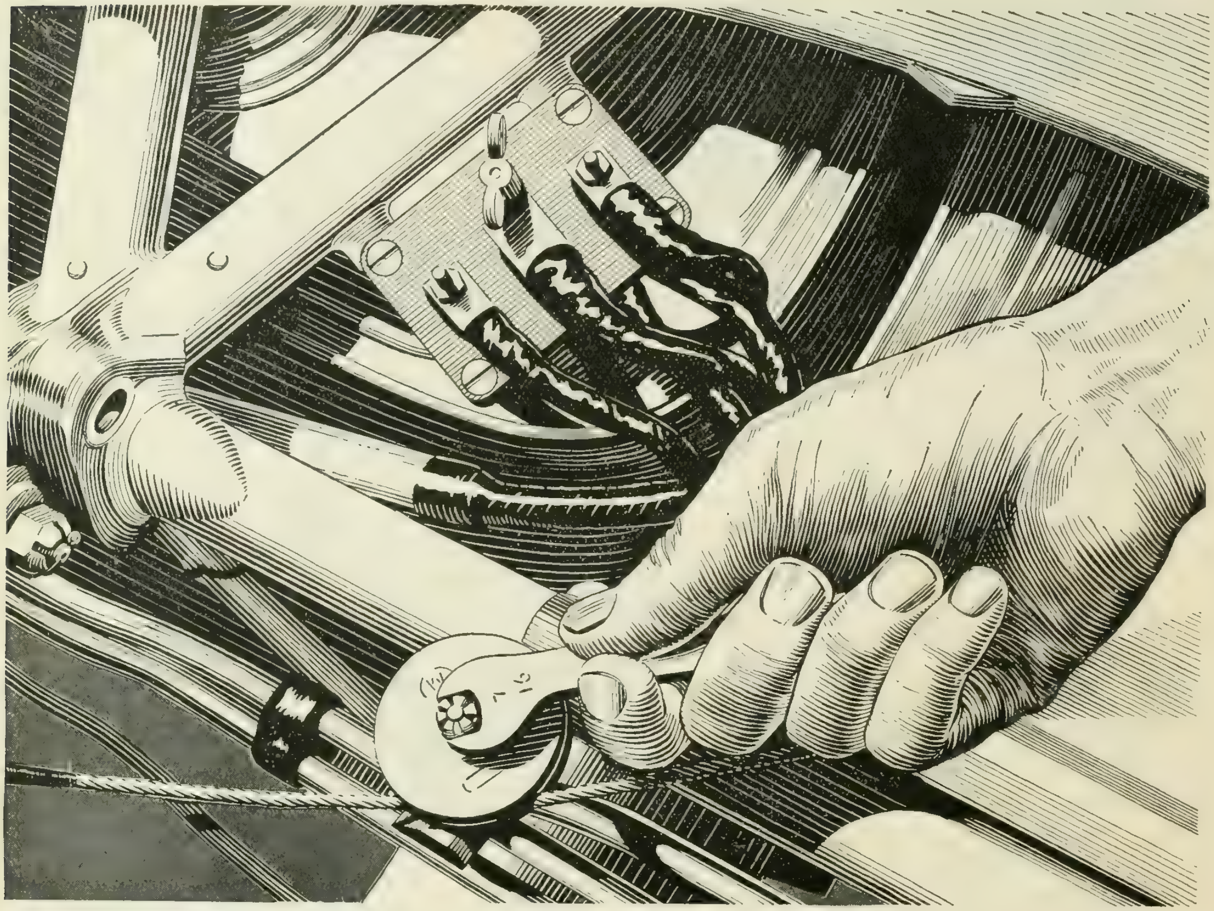
RYAN AIRCRAFT CORPORATION
LOCKHEED AIRCRAFT CORPORATION
PARKS AIR COLLEGE, INCORPORATED
PARKS AIRCRAFT CORPORATION
EASTMAN AIRCRAFT CORPORATION
AIRCRAFT DEVELOPMENT CORPORATION

DETROIT AIRCRAFT
UNION TRUST BUILDING, DETROIT

BLACKBURN AIRCRAFT CORPORATION
MARINE AIRCRAFT CORPORATION
GROSSE ILE AIRPORT, INCORPORATED
GLIDERS, INCORPORATED
AIRCRAFT PARTS COMPANY, INCORPORATED
DETROIT AIRCRAFT EXPORT CORPORATION

CHANIN BLDG., NEW YORK :: ROOSEVELT BLDG., LOS ANGELES

FIRST AROUND THE WORLD



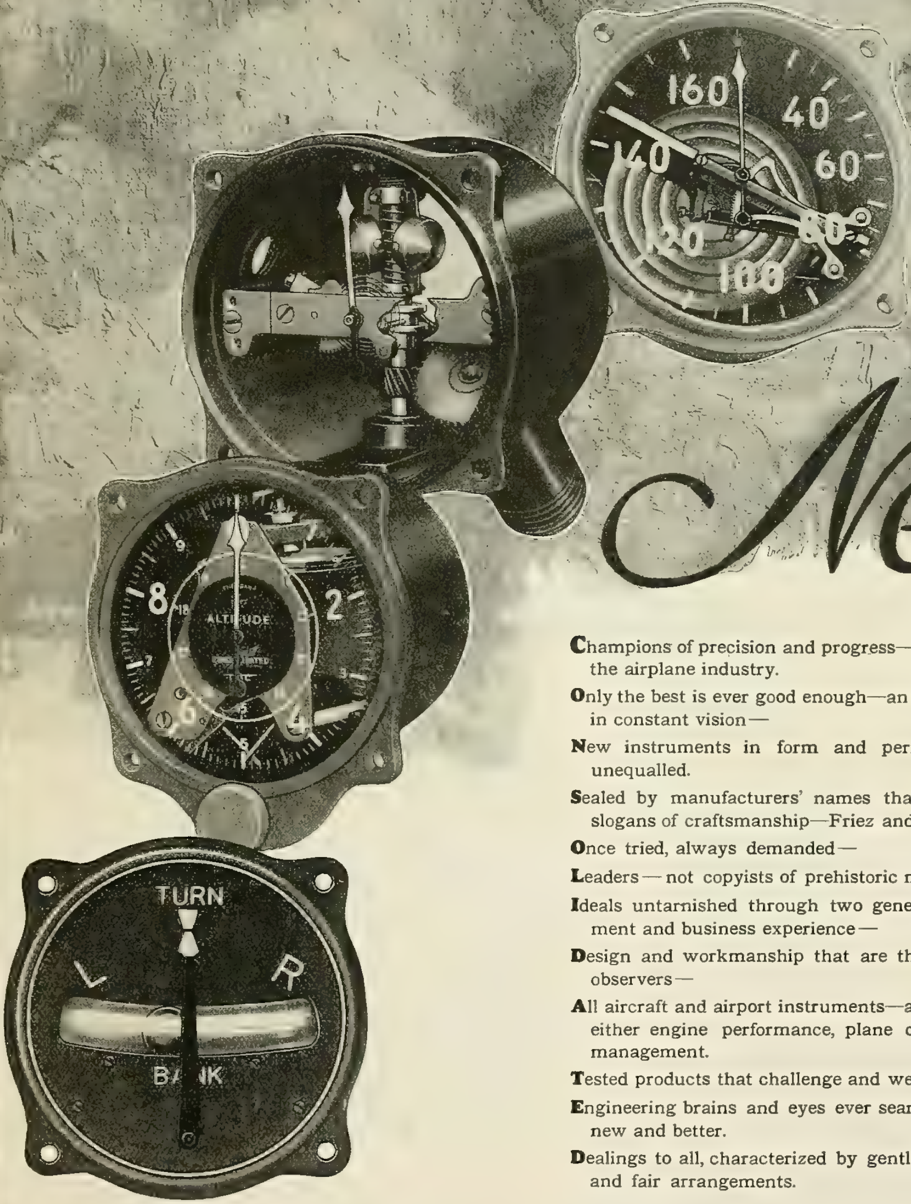
Dependability's Cradle!

IN the seemingly unimportant details of airplane construction lies the cradle of dependability!

It takes many mole hills to make a mountain! In the final analysis, the completed airplane is but the sum total of a thousand and one details correlated into a single finished unit. The lack of strictest attention to but one minor detail can mar dependable performance. This stands as the reason why Douglas stresses the human element, the men who perform these details . . . craftsmen all! Only consummate human skill can take the finest engineering and quality production materials and blend in the two a perfection in workmanship that results from holding each minor operation to be of major importance! Only through such insistence can be born the fact . . . *Douglas Means Dependability!*

DOUGLAS
AIRCRAFT CO.
INCORPORATED
Santa Monica California

CONSOLIDATED INSTRUMENTS



New

Champions of precision and progress—the new vogue in the airplane industry.

Only the best is ever good enough—an aim and ambition in constant vision—

New instruments in form and performance as yet unequalled.

Sealed by manufacturers' names that themselves are slogans of craftsmanship—Friez and Aircraft Control.

Once tried, always demanded—

Leaders—not copyists of prehistoric modes.

Ideals untarnished through two generations of instrument and business experience—

Design and workmanship that are the observed of all observers—

All aircraft and airport instruments—a complete line for either engine performance, plane control, or airport management.

Tested products that challenge and welcome any test.

Engineering brains and eyes ever searching for what is new and better.

Dealings to all, characterized by gentlemanly procedure and fair arrangements.

Turn and Bank Indicator

New to the trade. Easy of installation. Requires no soldering of tubes. Driven directly from motor. Operates at lowest plane speeds. Unaffected by temperature. Cannot be clogged by ice formation. For banking—a large steel ball free from centrifugal disturbance.

CONSOLIDATED INSTRUMENT CO.

of AMERICA, INC.

Baltimore St. and Central Ave. - Baltimore, Md.

Divisions

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Aircraft Control Corp. - Philadelphia, Pa.

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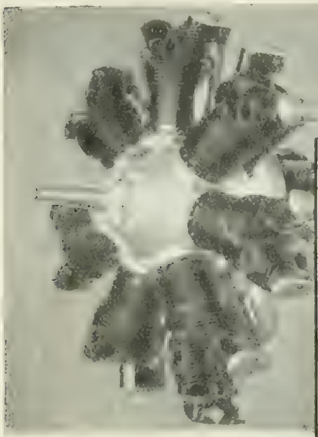
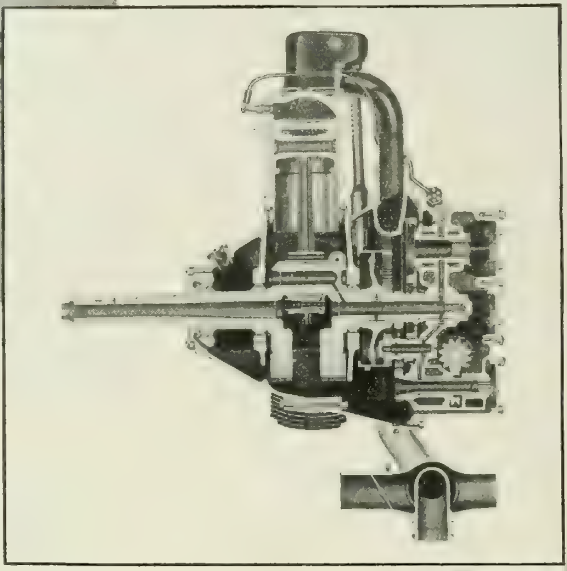




Continental 7-cylinder, radial, air-cooled airplane engine manufactured by CONTINENTAL AIRCRAFT ENGINE CO., Detroit, Mich. Center illustration shows sectional engine view and lower right is Nickel Alloy Steel two-piece crankshaft.

Dependable materials are the best assurance of dependable performance

Nickel Alloy Steel Parts

IN CONTINENTAL AIRCRAFT ENGINES

Two-piece Crankshaft
S.A.E. 3140

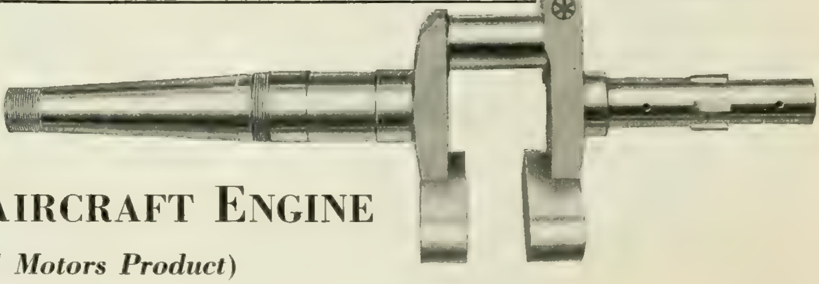
Piston Pins
S.A.E. 3115

Scavenger Pump Gear
S.A.E. 3140

Oil Pump Drive Gear
S.A.E. 3140

Cam Ring and Gear
Nickel-Chrome-Vanadium steel

Important Nuts, Studs and Bolts.



CONTINENTAL AIRCRAFT ENGINE

(A Continental Motors Product)

insures dependability with Nickel Alloy Steel Parts

The Continental aircraft engine embodies the well-known principles of efficient design characteristic of all the products of the Continental Motors Corporation, the largest exclusive engine manufacturers in the world. For 29 years Continental engines have held an enviable position in the automotive world. The same engineering skill and knowledge of materials have gone into the making of this airplane engine.

Nickel Alloy Steel is specified for the important parts of Continental aircraft engines. As in the case of practically all airplane engine manufacturers both in America and Europe, Nickel Alloy Steels are accepted by Continental Motors as standard materials for all parts requiring exceptional strength, impact- and fatigue-resistance per unit of weight.

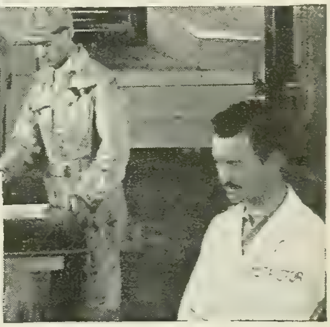
Their widespread use for highly stressed parts of truck, tractor and airplane engines is conclusive evidence that Nickel Alloy Steels provide a better combination of mechanical properties than other available materials.

Nickel
FOR ALLOY STEEL

Information on the properties and applications of Nickel Alloy Steels will be gladly furnished by our staff of engineers

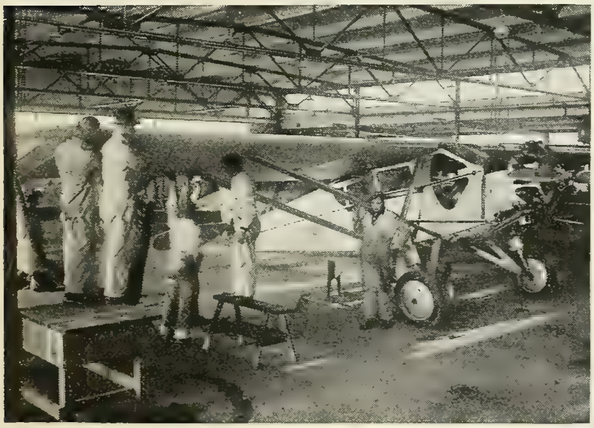
INCO NICKEL THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y. INCO NICKEL

The woodworking department of the Airplane and Engine Mechanics School. Here you build up complete new wings under actual modern factory conditions. Students assemble the ribs, cut out on woodworking machine various other parts and build the complete wing.



PARKS-TRAINED MEN
are in great demand in aviation » »

There are two ways for you to get a start as an airplane and engine mechanic. You can take a training course at some local school with inferior or even *average* facilities—or you can come to Parks and receive the *very finest* and *most complete* training ever offered by a civilian aviation school. A diploma from Parks will open many doors which might otherwise be closed. Graduates of Parks Airplane and Engine Mechanics School are holding down *responsible jobs* everywhere.



Parks Air College was one of the first to be licensed by the U. S. Department of Commerce as a fully accredited transport school.

Why is this? Simply because the big aviation executives know that Parks gives the best training to be had anywhere. They know that Oliver L. Parks, an internationally known leader in aviation instruction, is in constant and direct supervision of his students' training.

The men responsible for hiring mechanics know, too, that every Parks instructor is a man of skill, experience and judgment—and that every man who graduates from Parks has received the *kind and amount* of personal instruction that enables him to step into a good job *immediately.*

Parks has the finest equipment money can buy. Recently, a Wasp-powered tri-motored Ford monoplane and a new Ryan brougham, with a 300-H.P. Whirlwind engine, have been added to our large fleet of planes which are used for *training purposes only!*

When you come to Parks, you will find everything "all set" for you. Ideal living conditions (right here at Parks Airport), recreational facilities, the great city of St. Louis only a few minutes distant—in fact, everything you need and want while fitting yourself for the job you wish to fill!

Sign and mail the coupon below and receive our beautiful booklet, "The Man Who Tunes the Plane." Don't delay—mail the coupon *today.*

PARKS AIR COLLEGE
DIVISION OF DETROIT AIRCRAFT CORPORATION
360 Missouri Theatre Building
ST. LOUIS ≚ MISSOURI

» » COUPON « «

PARKS AIR COLLEGE,
360 Missouri Theatre Bldg., St. Louis, Missouri

Without cost or obligation to me, please mail your illustrated catalog.

Name ....
Street address ....
City .... State ....
Occupation .... Age ....

Today's ships are fine...

Aerial view of the United Airport of Boeing System, Burbank, Cal., showing first units, including air depot, hangars and runways completed. Design, construction and equipment by Austin

NOW let's have more REAL PORTS

SHIPS of today are fast, safe and reliable. They are as perfect as present-day research and experience can make them . . . *but can we say as much for the airports where these ships take off and land daily?*

Realizing that development of airports is a mighty factor in the progress of aviation, Austin created an organization of airport engineers and builders which, in the past ten years, has already provided improved facilities in 21 states and 37 cities from Coast to Coast.

Selection of sites and every task up to and including construction of complete airports has been Austin's responsibility, and here, briefly, are the services this nation-wide organization offers:

Airports—Preliminary Surveys and reports—Site Selection.

Complete Engineering, including topographical map; detailed plans and specifications for grading, drainage, lighting, runways and all airport buildings.

Complete Construction—Grading, drainage, lighting, runways, air depot, hangars, shops, flying schools and aeronautical factories.

Hangars, aircraft and accessory manufacturing plants—designed, built and equipped.

Ask for a copy of the helpful booklet "Airports and Aviation Buildings"—3rd Edition—as well as approximate costs and additional information on any project contemplated. Wire, phone, write or use the convenient memo below.

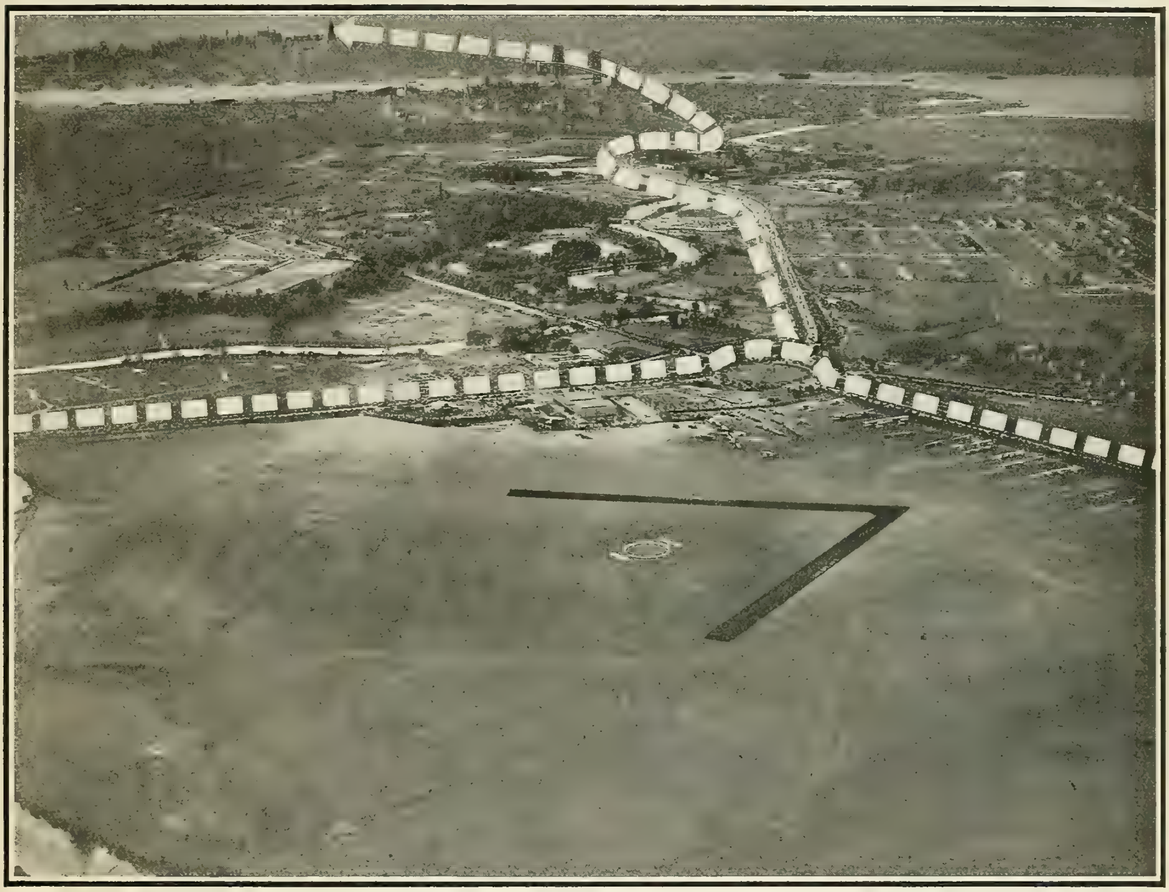
THE AUSTIN COMPANY

Airport Engineers and Builders ✈ Cleveland

New York Chicago Philadelphia Newark Detroit Cincinnati Pittsburgh St. Louis Seattle
Portland Phoenix The Austin Company of California Ltd.: Los Angeles, Oakland and San Francisco
The Austin Company of Texas: Dallas The Austin Company of Canada, Limited

Memo to The Austin Company, Cleveland—We are interested in ☐ Airport (Municipal) (Private) containing .... acres. ☐ Hangar........x........
with............ft. clearance. ☐ Factory approx........................sq. ft. Send copy of "Airports and Aviaiion Buildings." Name........................
Position .... Firm .... City .... A D 3-30

ACCESSIBILITY and VISIBILITY



are the most vital factors in the aviation industry today. You can have them at Central Airport with economy

No other aviation center in the world is as close to 3,000,000 people or such a potential market for aircraft and flying service . . . to so many important raw and manufactured aviation materials . . . to such highly skilled labor.

The heart of Philadelphia is only 15 minutes away, over a 10-car highway and the Delaware River bridge; the center of Camden, 6 minutes; ocean shipping and main rail lines, 10 minutes. Central Airport is accessible!

Five main highways converge here: The White Horse Pike to Atlantic City; Marlton Pike to Spring Lake and Lakehurst; New Jersey State Highway to New York; Kaighn Avenue to center of Camden; Crescent Boulevard to Philadelphia. A focal point—it insures visibility!

THIS aerial shot of Central Airport—and part of the Philadelphia-Camden area—shows better than words why you should locate here. It as clearly indicates that the men who conceived, developed and now operate it are aviation men as well as business men. This airport has a twofold purpose:

First, to be the center of flying activities in this section of the country! The broad, level, naturally drained and openly approached field is not excelled anywhere. Fire-proof hangars, modern mechanical equipment, weather service, both teletype and radio, complete lighting for night flying, restaurant, rest-rooms, swimming pools and unlimited parking space combine efficiently to serve private fliers, transport companies and an air-minded populace.

Second, to be a great center of the aviation industry! Within a hundred-mile radius are the financial, political and pleasure capitals of the United States. Down the convenient Delaware, the wide-awake Central and South Americas are demanding aircraft, motors and accessories. Sailings are frequent; freight rates favorable. Leaders in the industry, quick to appreciate a strategic location, are already in operation here.

Highly desirable land adjacent to the field is still available for manufacturing and assembly purposes, for storage, display and office space. *It is offered at unusually attractive terms* to responsible parties who wish to buy or lease. Complete facts mailed on request. Write to Central Airport, Inc., Camden, New Jersey.

PHILADELPHIA-
CAMDEN

CENTRAL AIRPORT

Where Wear Is Greatest Use Federal-Mogul Bronze

DAY in and day out, thousands of times each day, the piston pin bushing is taking the shock each time that the cylinder fires—a series of mighty hammerlike blows. Hard, strenuous, wearing work. A better bronze here means something; its slightly greater cost means nothing.

Federal Bronze is made for this harder wear,—a tough, fibrous, wear-resisting bronze,—a special alloy that is different. Use Federal-Mogul Bushings for piston pins and all points where the wear is greatest.

FEDERAL-MOGUL CORPORATION
DETROIT, MICHIGAN

The Complete Federal-Mogul Line Includes:

- *Bronze-Back, Babbitt-Lined Bearings*
- *Die-Cast Babbitt Bearings and Bushings*
- *Bronze Bushings*
- *Bronze Washers*
- *Bronze Castings*
- *Babbitt Metals*
- *Bronze Cored and Solid Bars*

Licensed under U. S. Patents Nos. 1,455,939; 1,302,584; 1,302,838; 1,340,337.

Mogul
FEDERAL

You'll like these features offered by the WACO '165'

Appearance . . . Performance . . . Stamina . . . Economy . . . Typical WACO Value

• • •

(Approved Type Certificate No. 168)

YOU'LL *like* the WACO "165" from the first glimpse . . . its trim lines . . . its custom finish and wide choice of color combinations. You'll thrill to its easy take-off and quick climb . . . its effortless responsiveness to the controls . . . its arrow-like steadiness flying "hands off". . . its typical WACO ability to get in and out of the smallest fields.

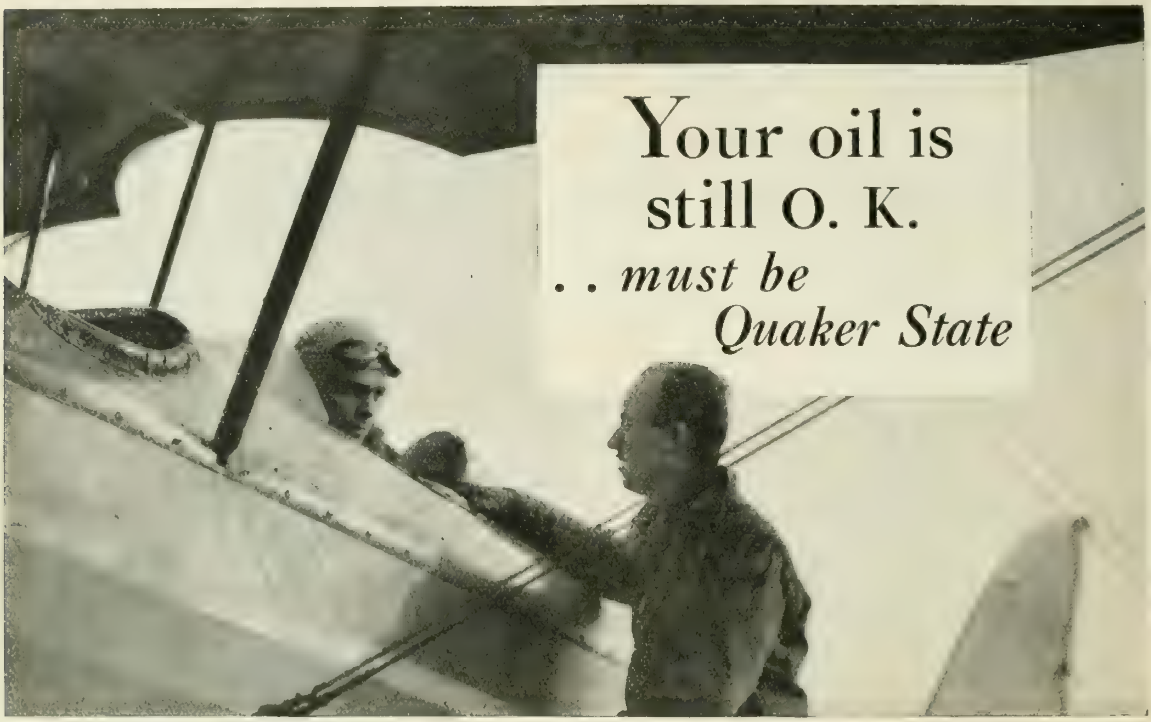
And you'll have absolute confidence in the *proved* design of the WACO "165". . . its extra ruggedness of construction . . . its ability to withstand an extraordinary amount of abuse. You'll be pleased with the completeness of its equipment . . . such as Bendix brakes, compass, air speed indicator and dual controls. You'll be *sold* on its thoroughly practical performance . . . disposable load of 1,070 lbs . . . fuel economy . . . three-place arrangement . . . ample and convenient luggage compartment.

The "165" is a typical WACO value. Its moderate price is due to quantity production methods, and is a result of WACO'S widespread popularity. There are more WACOS in use than any other make of commercial aircraft in America.

We will gladly refer you to the nearest one of the nearly 300 WACO dealers, that you may prove to yourself at first hand the merits of the WACO "165." And . . . today . . . write for your copy of the new booklet which gives full details and specifications of this unusual airplane. The WACO Aircraft Company, Troy, Ohio.

WACO AIRPLANES

"Ask any Pilot"



Your oil is still O. K. *. . must be Quaker State*

QUAKER STATE Aero Oil makes a difference in your motor from the minute you give her the gun—but the most startling difference, the most surprising difference comes *hours* later.

Give Quaker State enough punishment, enough hours of flying to cripple an ordinary oil—and you'll find it good for more, plenty more.

Why? Because there's an extra quart of heat-fighting, friction-soothing *lubrication* in every gallon of Quaker State—yes, a whole quart *more* than you get in the gallon of ordinary oil. And *that's* due to the way in which Quaker State Aero Oil is refined.

Ordinary refining leaves in every gallon of oil, one quart or more that is of no practical value as a lubricant to your motor—a quart of waste.

But Quaker State Aero Oil is not refined in the ordinary way. It is *super*-refined—carried a step further. This extra step removes the quart of waste that ordinary refining leaves in. In its place you get a quart of the finest *lubricant*—you really get an *extra* quart in every gallon of Quaker State!

And all four quarts in every gallon of Quaker State Aero Oil are made from 100% pure Pennsylvania Grade Crude Oil. That's the very finest "base" an aero oil can have—it's the finest the world produces.

Ask for Quaker State Aero Oil at your airport. It's remarkable how it holds its body. It will stand heat that would burn out an ordinary oil. Try it—and your motor will sing the praises of the sweetest, smoothest lubrication it ever took down a runway!

AERONAUTICAL CHAMBER OF COMMERCE

Get that extra quart in every gallon of

QUAKER STATE AERO OIL

TRADEMARK REG. U. S. PAT. OFF.

QUAKER STATE OIL REFINING CO.

Oil City, Pa.

. . . . . . *Other Pure Pennsylvania Products are:*

QUAKER STATE MEDIUM MOTOR OIL • QUAKER STATE MEDIUM HEAVY MOTOR OIL
QUAKER STATE HEAVY MOTOR OIL • QUAKER STATE COLD TEST
QUAKER STATE TRACTOR OILS

Guaranteed 100% PURE PENNSYLVANIA OIL
The highest grade oil in the world

Continued Leadership—
AFTER 27 YEARS OF SUCCESS!

Naturally, the Greer Aviation Student Has the Greater Advantages!

YOUR success in Aviation depends upon the experience of the School which gives you your first training.

Experience, prestige and success come only to those who have themselves learned what to do—and how to do it—correctly. These qualities cannot be acquired in one year or five years, yes, even ten years. It takes a lifetime of study and effort!

Only Greer College can offer you the experience of 27 years of active, successful training methods.

Only Greer College can offer you the equipment a thorough training demands—12 floors of machinery, motors, classrooms, assembly shops, and materials. Of course, training planes and flight instructors are licensed by the Government.

Only Greer College needs to make use of three Airports within the boundaries of Chicago.

Only Greer Students have the advantages that Chicago, the "Air Capital of the United States," can give them—the world-famous Municipal Airport, about which are grouped the hangars of every famous transport company in the East and Mid-West—endless varieties of industries are here, both in the field of Aviation and out of it. Here, if anywhere, are the greatest opportunities for the graduate.

You clear visioned, ambitious and air minded young men deserve the best advantages a training school can offer you. Obviously, the Greer Student has the greater advantages.

Before you turn this page, clip the coupon in the lower right hand corner and send for your copy of "Winning Your Wings," the true story of a dependable school of Aviation!

(Inspection and Rating by U. S. Dept. of Commerce Applied for.)

One of These Greer Aviation Courses Will Meet Your Demands!

Pilot's Ground Course

This course is intended for those who wish a thorough training in the first principles of flying, with the intention to fly as soon as possible.

Airplane Construction and Motor Mechanics' Course

This is the most complete course in ground work offered by any school, meeting Government standard.

Pre-Solo and Private Pilot's Course

This course is the first step toward a Government License and includes 10 hours dual flying, if necessary, and 10 hours solo. These courses can be taken separately.

Limited Commercial or Industrial Pilot's Course

This is the next step forward to a more valuable Government License. 50 hours of solo and necessary dual flying.

Transport Pilot's Course

This is the course which will prepare you to receive a Government Transport Pilot's License, upon passing an examination. 200 hours of advanced flying under all kinds of conditions.

Special Advantages!

Railroad or bus fare allowed to Chicago to students who pay for their courses in advance.

FREE EMPLOYMENT SERVICE—Help to all Greer Students during their training period.

Greer College

2024 S. Wabash Ave.
Dept. 363 CHICAGO

MAIL THIS COUPON—TODAY

GREER COLLEGE, Dept. 363
2024 S. Wabash Ave., Chicago, Ill.

Please send me free your big Aviation book and full details about your Training and Employment Service.

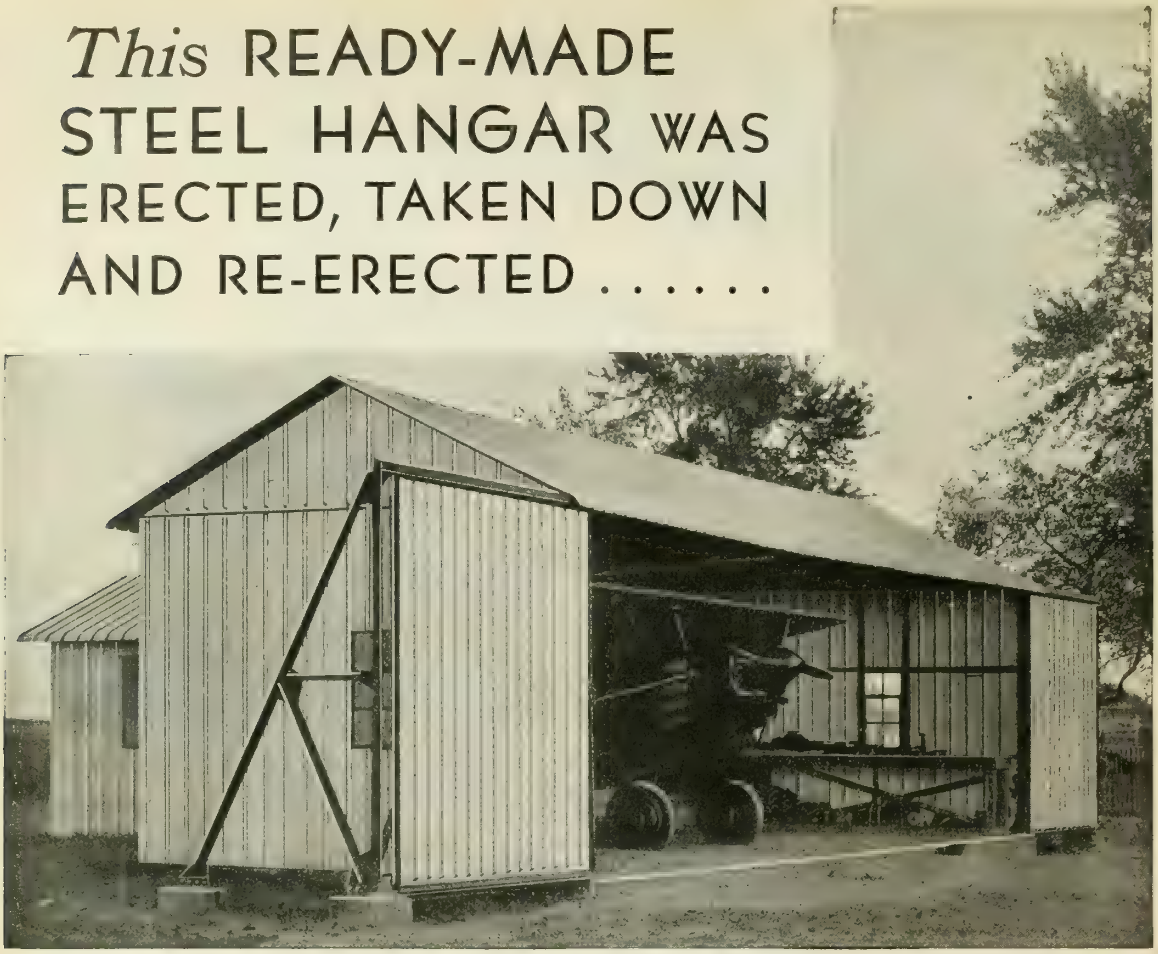
Name..

Address..

City..State........................

Age....................Occupation..

This READY-MADE STEEL HANGAR WAS ERECTED, TAKEN DOWN AND RE-ERECTED . . . . . .



. . . . without the loss of anything more than a few dropped bolts and taps, when the Iowa Air Transport Company, Boone, Iowa, moved it to a new airport location.

In Butler Ready-Made Steel Hangars, every unit is formed to template, and matched punching facilitates bolting accurately in position. Erection, taking down or re-erection is so simple that one man can do it with the smaller sizes.

Butler Individual Ready-Made Hangars are made in sizes suitable for all ships and with either half-round or gable roofs. The Butler 3-in-one Hangar has a garage and a work room built in.

T-shape design, finished appearance, fire-safeness, structural qualities which make for permanence, economy of acquiring and economy of maintenance—all these are Butler Ready-Made Hangar characteristics. Their sum-total is the solution of your airplane sheltering problem.

A new booklet pictures installation of Butler Individual and Commercial Airport Hangars. Butler engineering service will supply full information and prices if you will mention the size building in mind.

BUTLER

READY-MADE HANGARS

BUTLER MANUFACTURING COMPANY

1234 Eastern Avenue
Kansas City, Missouri

984 Sixth Avenue, S. E.
Minneapolis, Minnesota

STEEL BUTLER PRODUCTS

THE BERRYLOID FLEET—NUMBER TWELVE OF A SERIES

© 1930

The D. H. GYPSY MOTH *and*
Berryloid
AIRCRAFT FINISHES

Aircraft Berryloid in an appropriate combination of Roma brown, Vesta yellow, Berry red, black, and white, gives added dash to the trim lines of the Gypsy Moth illustrated above. From the first, every "Moth" has been protected 100% with Berryloid.

MEMBER · AERONAUTICAL · CHAMBER · OF · COMMERCE

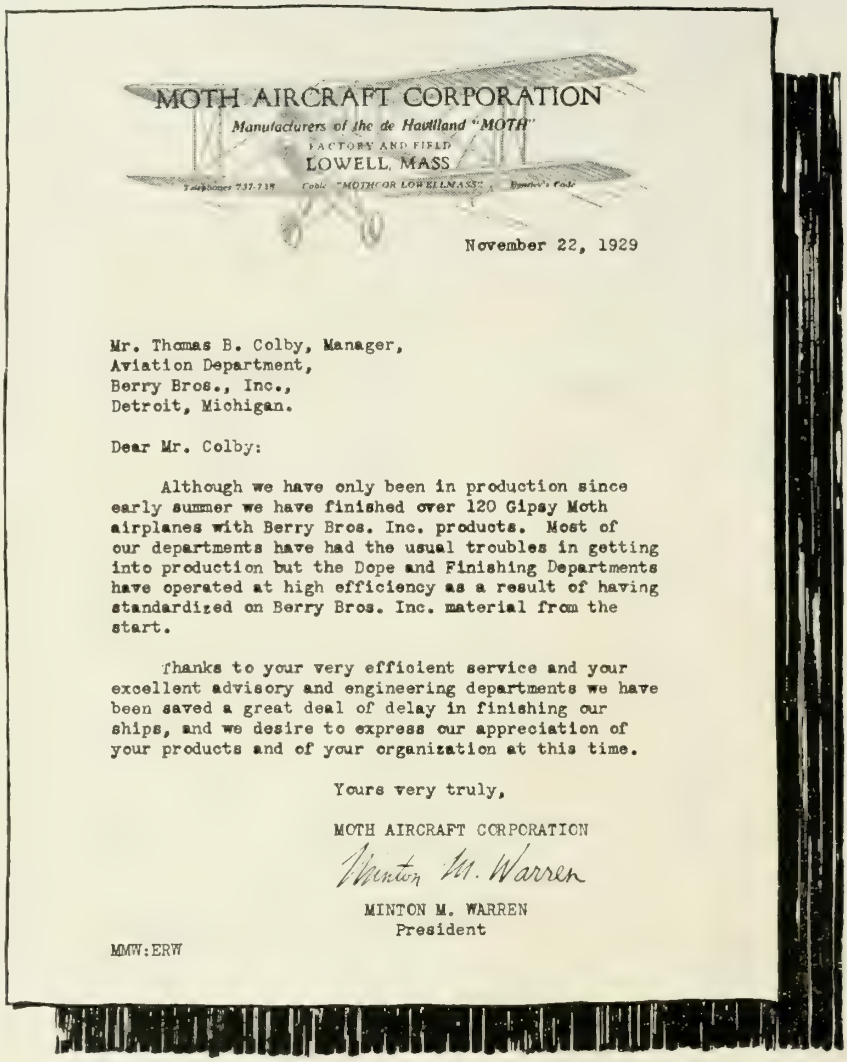
Berryloid

saves

time, ,

assures

satisfaction



MOTH AIRCRAFT CORPORATION
Manufacturers of the de Havilland "MOTH"
FACTORY AND FIELD
LOWELL, MASS.
Telephones 737-738 Cable "MOTHCOR LOWELLMASS" Bentley's Code

November 22, 1929

Mr. Thomas B. Colby, Manager,
Aviation Department,
Berry Bros., Inc.,
Detroit, Michigan.

Dear Mr. Colby:

Although we have only been in production since early summer we have finished over 120 Gipsy Moth airplanes with Berry Bros. Inc. products. Most of our departments have had the usual troubles in getting into production but the Dope and Finishing Departments have operated at high efficiency as a result of having standardized on Berry Bros. Inc. material from the start.

Thanks to your very efficient service and your excellent advisory and engineering departments we have been saved a great deal of delay in finishing our ships, and we desire to express our appreciation of your products and of your organization at this time.

Yours very truly,

MOTH AIRCRAFT CORPORATION

Minton M. Warren

MINTON M. WARREN
President

MMW:ERW

GYPSY MOTH
was preceded
in this series
by
STINSON
FOKKER
BUHL
TRAVEL AIR
EAGLEROCK
KEYSTONE
BOEING
COMMAND-AIRE
FAIRCHILD
MONO AIRCRAFT
and
GREAT LAKES

DISTRIBUTORS OF BERRYLOID AIRCRAFT FINISHES:

Pacific Airmotive Corp.
3417 Angeles Mesa Drive, Los Angeles, Cal.

Platt & Tingle
49 S. W. First St., Miami, Florida

McMullen Aircraft Co.
Tampa, Florida

Air Associates, Inc.
Municipal Airport, Chicago, Ill.

Central Wall Paper & Paint Co.
Indianapolis, Ind.

East Coast Aircraft Corp.
Municipal Airport, Boston, Mass.

Johnson Airplane & Supply Co.
541 W. Douglas Ave., Wichita, Kan.

Northwest Airways, Inc.
St. Paul, Minn.

Bredouw-Hilliard Aeromotive Corp.
604 Broadway, Kansas City, Mo.

Air Associates, Inc.
Roosevelt Field, Garden City, N. Y.

The Embry-Riddle Co.
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West Penn. Lacquer Co.
5707 Friendship Ave., Pittsburgh, Pa.

Thompson Aeronautical Corp.
Municipal Airport, Cleveland, Ohio

Johnson Airplane & Supply Co.
Dayton, Ohio

Ludington Flying Service
Philadelphia, Pa.

Southern Aeromotive Service, Inc.
Ft. Worth, Texas

Northern Airways, Inc.
Wausau, Wisconsin

Southwest Air Fast Express, Inc.
Municipal Airport, Tulsa, Okla.

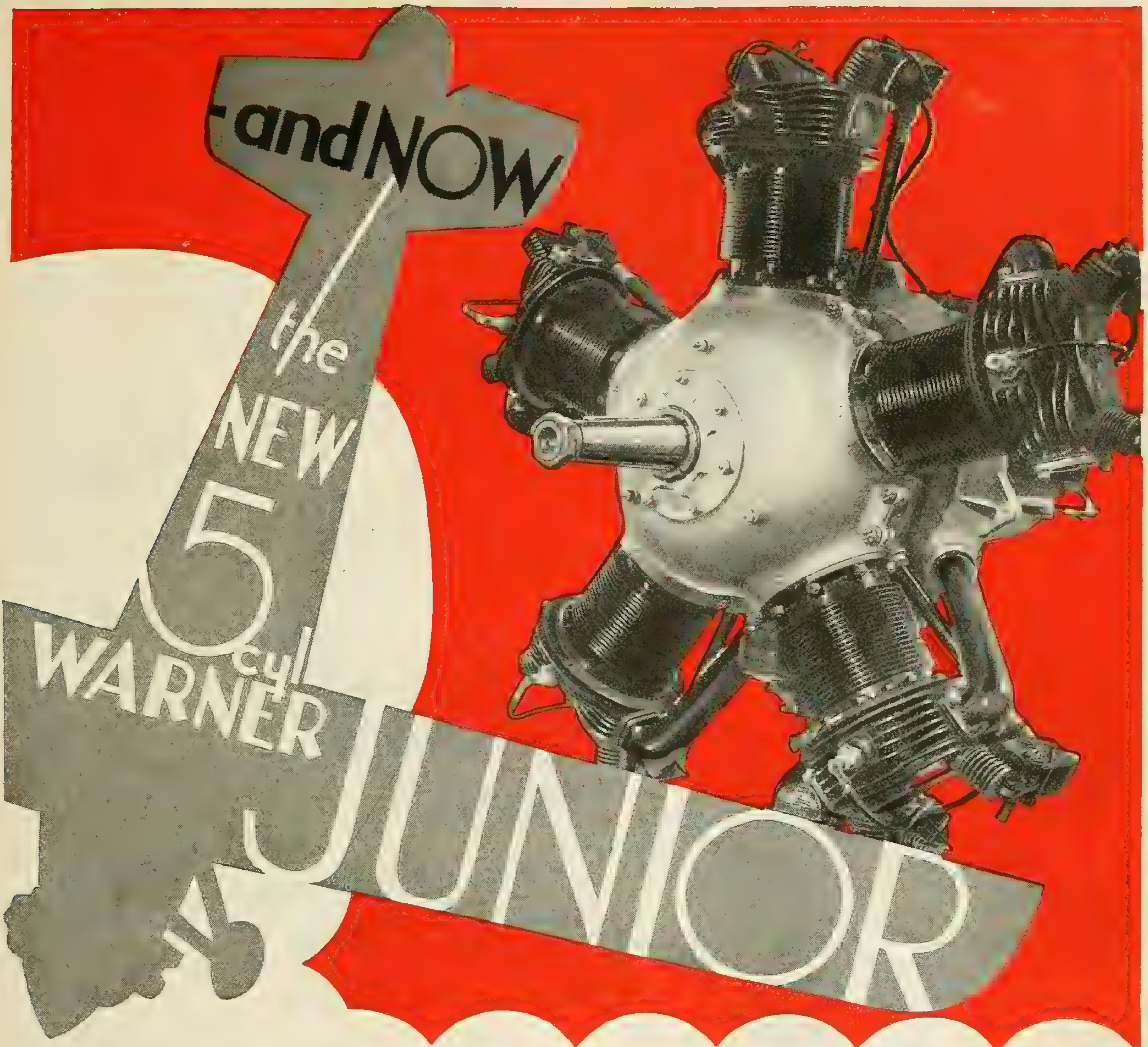
Aeronautical Corp. of Canada, Ltd.
Winnipeg, Canada

MANUFACTURERS · OF · PROGRESSIVE · AIRCRAFT · FINISHES

BERRY BROTHERS

Varnishes Enamels Lacquers

Detroit, Michigan *Walkerville, Ont.*



Literature covering in detail the various major features, fully illustrated, and giving complete specifications will be sent you on request.

And what an engine!

With the time tested and proven lineage of the 7 Cylinder Warner Scarab to start with, and the benefit of all the knowledge and experience gained in the production and actual performance of that now famous model, no wonder we can be proud of this newest Warner achievement.

90% interchangeability of parts with the 7 Cylinder Model, assures that in this new 5 Cylinder Warner Junior all of the salient and proven features of the 7 have been retained.

Nothing untried, nothing experimental, finds a place in this Junior Model—only those proven features of design and construction that have enabled Warner engines during the last two years to win all closed course races and all Cross Country Derbies in their power class at the National Air Races.

For use in the light aeroplanes that have recently come into such deserved popularity, this 85 H. P. Warner Junior embodies all of the qualities heretofore obtainable only in much larger engines.

Produced in one of the finest and most modern of aircraft plants in the entire country and with unexcelled production facilities, we are able to offer this new Warner Junior at a very moderate price consistent with the Warner quality that is built and designed into it.

WARNER AIRCRAFT CORPORATION
DETROIT MICHIGAN

WARNER "Scarab" ENGINES

Off to business . . . . . at two miles-a-minute

HUNDREDS of successful, ever-energetic American executives have found in the airplane an indispensable business ally. Modern men whose affairs require their presence at several distant points in one day—or many places in a month—have turned with a sense of deep appreciation to private air travel.

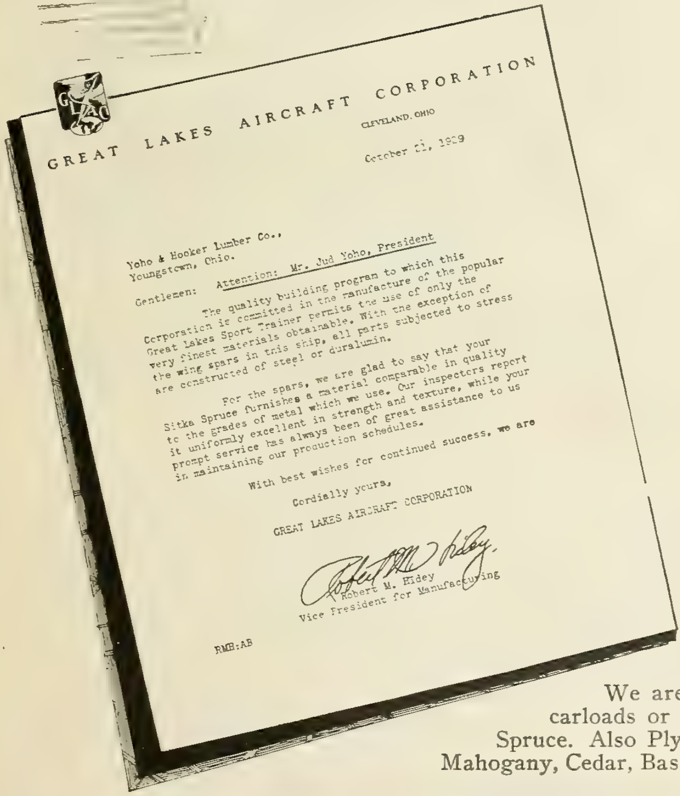
◗ Spartan builds airplanes exactly suited to this aggressive business regime. Spartans are amply powered for quick take-off, attain high speed in flight, yet will land slowly and as safely on the small, private field as on the airport.

◗ Spartans are safe because of extreme sturdiness, fool-proof spinning qualities and slow landing speed . . . . economical because they can be operated for twelve to fourteen cents per mile . . . . and easy to fly because of basic stability and positive, sensitive control.

ILLUSTRATED BROCHURE SENT ON REQUEST

Spartan biplanes are offered with the choice of two engines: The 225 h. p. Wright "Whirlwind Seven" and the 165 h. p. Comet. Special equipment of each model includes dual controls, metal propeller, booster magneto, gasoline gauge, air-speed indicator, oleo gear, 30 x 5 Bendix wheels and brakes, adjustable stabilizer, navigation lights. Prices range from $7750 to . . . . $5675 fly away Tulsa

SPARTAN AIRCRAFT COMPANY • TULSA, OKLAHOMA



GREAT LAKES AIRCRAFT CORPORATION
CLEVELAND, OHIO

October 21, 1929

Yoho & Hooker Lumber Co.,
Youngstown, Ohio.

Gentlemen: Attention: Mr. Jud Yoho, President

The quality building program to which this Corporation is committed in the manufacture of the popular Great Lakes Sport Trainer permits the use of only the very finest materials obtainable. With the exception of the wing spars in this ship, all parts subjected to stress are constructed of steel or duralumin.

For the spars, we are glad to say that your Sitka Spruce furnishes a material comparable in quality to the grades of metal which we use. Our inspectors report it uniformly excellent in strength and texture, while your prompt service has always been of great assistance to us in maintaining our production schedules.

With best wishes for continued success, we are

Cordially yours,

GREAT LAKES AIRCRAFT CORPORATION

Robert M. Hidey
Robert M. Hidey
Vice President for Manufacturing

RMH:AB

Pleased With

Sitka Spruce

THE Great Lakes Sport Trainer with the "pursuit complex" requires exceptional strength in such important members as Wing Spars. SITKA SPRUCE furnished by The Yoho & Hooker Lumber Company is found to be uniformly excellent in strength and texture. Their complete satisfaction is indicated in the enthusiastic letter reproduced here.

We are prepared to make immediate shipment in carloads or small orders via express on Aircraft Sitka Spruce. Also Plywoods 1/32", 1/24", 3/64", 1/6", etc. Birch, Mahogany, Cedar, Basswood, Balsa Wood, Box Spar Planking, etc.

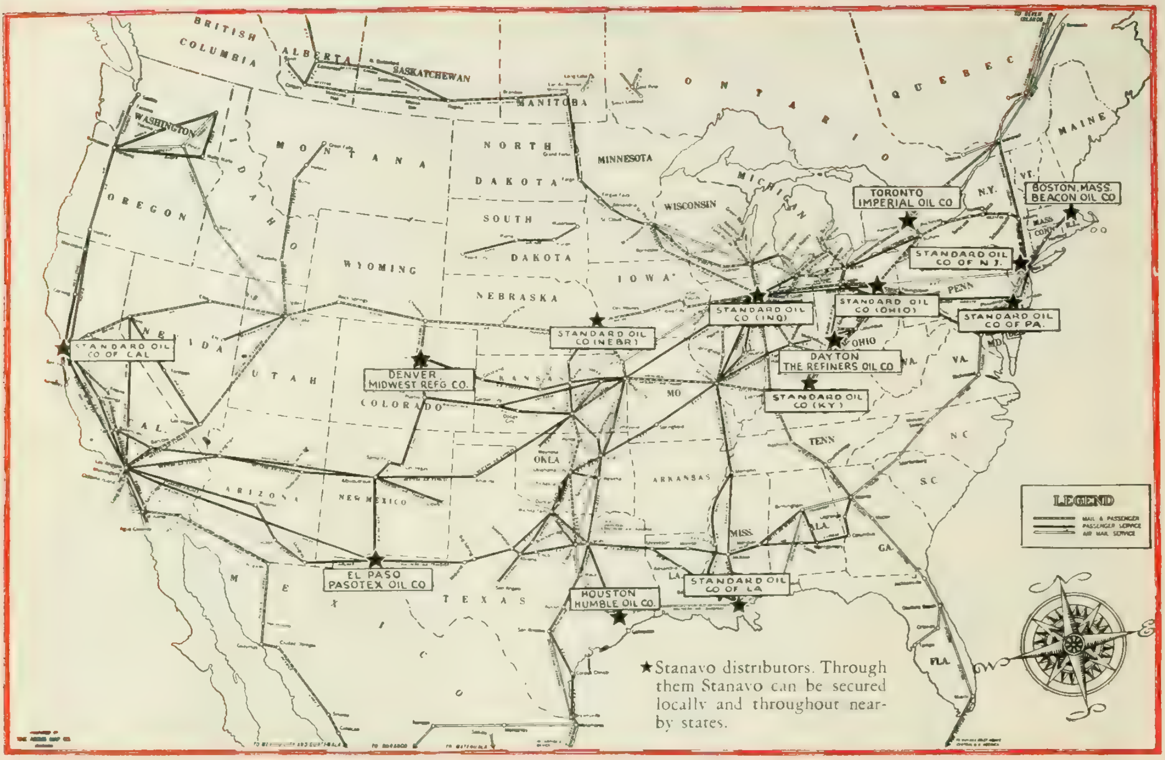
Write for Complete Catalog and Price List

YOHO & HOOKER LUMBER CO.

Carrying the Largest Stock of Aircraft Woods in the World

244 Wing Building **Youngstown, Ohio**

WHETHER YOU GET IT IN MAINE OR CALIFORNIA



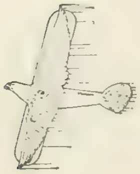
★Stanavo distributors. Through them Stanavo can be secured locally and throughout nearby states.

YOU CAN RELY UPON THE UNIFORMITY OF STANAVO

Stanavo is a quality product prescribed by the Stanavo Specification Board, Inc. The oil is a definitely better oil—in quality, in uniformity, in the genuinely finer engine performance it gives. It has an exceptionally low pour test, flat viscosity curve, and low carbon content.

Now Stanavo is available at flying fields and airports all over the country. Day by day more airmen find that here, at last, is an oil—absolutely uniform, free from carbon, long lasting, always dependable, one with which they can safely fly from cold to hot climates.

Use it in your own ship. It will quickly convince you by its own performance.



STANAVO
AVIATION ENGINE OIL

One Brand—STANAVO. One Quality—the Highest—Throughout the World.

STANAVO SPECIFICATION BOARD, Inc.

910 South Michigan Ave., Chicago
225 Bush St., San Francisco
26 Broadway, New York City

Opportunity awaits YOU in AVIATION

Learn at the school of *personal instruction

Unloading a $200.00 pay load

YOUNG man, if you want a real opportunity, read every word of this thrilling money-making message — you want success, you want good money — you want Popularity. Aviation, America's fastest growing industry offers you these — Needs you, Calls You.

Earn up to $400 — $1000 a month

Hundreds of men—men with just ordinary intelligence and good, sound physique — men just like you — are now aerial photographers, mechanics, airport experts, pilot salesmen, flying instructors. Their work is fascinating, the future is rich, they are making up to $1000 and more each month.

Taking Aerial Photographs

PERSONALIZED training — the key to success — as pilot, as mechanic

Mr. Elling O. Weeks will tell you from his twenty years' flying experience that *personalized* training is the key to aviation success. Mr. Weeks *insists* in his school, that classes be so arranged that you actually repair engines and planes — make real ribs and struts — build experimental gliders and planes all under the *personal* supervision of a former United States Naval officer previously in charge of one of Uncle Sam's largest Aviation Schools. He *knows* — You learn. Pilots are taught to fly in latest U. S. Licensed planes, under U. S. Licensed pilots at U. S. Air Mail Field.

Piloting the Air Mail

Test PERSONALIZED Aviation

—of course, when you are going into Aviation you want the best training you can get—the best *trained* men get the best jobs. Mr. Weeks is so confident of your complete satisfaction in his *personalized* course that he is willing for you to *test* without obligation. The coupon brings the details of this unusual plan. Just fill in your name and address. Certainly you want the best course you can get. Mail the success coupon *now*.

An exhibition flyer — the most popular man in town

"In getting my position as pilot for the Parker Pen Company, I found Mr. Elling O. Weeks of greatest assistance — in my opinion his personalized training is the sure stepping stone for any man who wants to get into aviation." EDGAR LA PARLE

"I have just secured a position as instructor in Aerial Acrobatics and I want to thank you for your wonderful *personalized* training course. My dreams have more than come true."

FRANK ERNST

WEEKS AIRCRAFT MILWAUKEE

Lesson extracts FREE

Perhaps you have thought of aviation as requiring unusual ability, a special *"gift"*. Don't hesitate longer on this account. You can learn for yourself how easy, simple it is to FLY. The FREE flying booklet "WINGS of opportunity" contains actual extracts of lessons. Master them and prove you can be an aviator, an aviation mechanic. The coupon brings the book and the "Success" Plan. Mail it today.

• • • • •

**Mr. Elling O. Weeks, America's oldest active flyer at the head of a flying school (Soloed 1909) knows the value of personal instruction. Classes at Weeks are so arranged that instruction is given by Heads, not just assistants.*

AVIATION SUCCESS COUPON

WEEKS AIRCRAFT CORPORATION
370-3-11th Street, Milwaukee, Wis.

Please send me without obligation, your plan that enables me to test your *personalized* aviation school *without obligation*. I want to become (check below)

☐ Pilot ☐ Aviation mechanic

Name..........

Street Number..........

City.......... State..........

Age..........

Please include a copy FREE of "WINGS of Opportunity".

There are more Aerol Struts in use today than any other make.

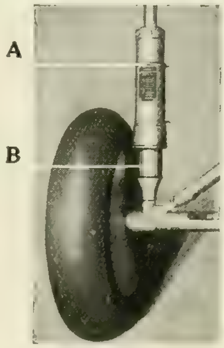
AEROL STRUTS IN HOLLAND.

A SHORT time ago, the following message was received from H. Pander & Zonen of Holland. It is typical of the international recognition accorded Aerol Struts.

"The demonstration on Aerol Struts we gave for the Dutch Government made a big impression and as a result, the Army adopted these struts for use on the Fokker single seater fighters being built for use in Holland and the Dutch Colonies.

"We are using Aerol Strut as standard equipment on all aircraft of our manufacture and find that they have greatly increased public confidence in our planes and also the confidence of the pilots who fly them.

"The Aerol Tail Wheel Strut gives complete satisfaction. Taxiing is like riding in a motor car and there is no jumping up of the tail after a bad landing.



This view shows how Aerol Struts are installed between the fuselage and wheels. "A" is the stationary cylinder. "B" is the sliding piston attached to the axle allowing perfect freedom of movement, yet effectively eliminating destructive shock before it reaches the fuselage.

"The Dutch Aero Club and Dutch National Flying School use Aerol Struts exclusively and are absolutely sold on their value. They feel it to be a fact that many crashes made by pupils previous to their use of Aerol Struts would have been prevented."

Wherever ships are flown—wherever pilots get together—Aerol Struts are recognized as the finest protection that can be given any plane.

Aerol Struts are manufactured by The Cleveland Pneumatic Tool Company, Cleveland, Ohio. The company also offers a complete line of air-operated hammers, drills and accessories.

AEROL shock absorbing STRUT

YOU SAVE $1250 AND

LEARN TO FLY IN YOUR OWN PLANE

HERE IS POSITIVELY THE BIGGEST OPPORTUNITY EVER OFFERED PROSPECTIVE FLYERS!

The Art Goebel School of Flying, licensed and approved by the government; with its curriculum modeled after army training methods; a modern up-to-date, fully and newly equipped school, with government approved teachers and flying instructors, makes this startling offer:

◆

Read carefully the five points of this great offer. A marvelous opportunity to learn flying under the best conditions ever provided. And it is open to you

At An Actual Saving of $1250

[EASY TERMS IF DESIRED]

◆

1. One Brand New latest type FLEET AIRPLANE.
2. One complete 50-Hour Flying Course in this government approved and licensed school.
3. One complete course in Aeronautical salesmanship.
4. A guarantee to assist you in obtaining employment in any position which your training entitles you to fill.
5. FREE Transportation by Air from your home to The Art Goebel School in Kansas City.

HERE IS THE OPPORTUNITY OF THE CENTURY

When you complete your 50-Hour Flying Course, and your Aeronautical Salesmanship Course, you step into your own FLEET PLANE fully prepared, properly trained and start right into AVIATION, the fastest growing, most interesting, best paying and most fascinating industry of all times.

The Famous "FLEET" Plane

Powered by the Kinner K-5 Engine. Strength factors in excess of Army, Navy and Department of Commerce Specifications. Incomparable maneuverability. Instant control and features too numerous to list make the "FLEET" the perfect plane. Known everywhere as the best training plane manufactured.

Earn Money Flying Your Own Plane

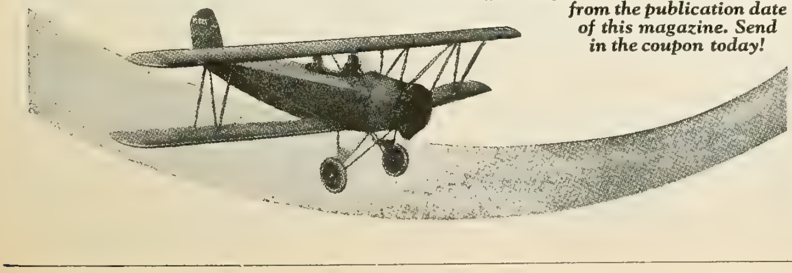
Aviation needs men who own planes for advertising, demonstrating, salesmanship, aerial photography, cotton dusting and countless other big paying positions.

This School Has Been Approved And Licensed By the Government

Which is your absolute guarantee that the school, its equipment, its courses of study and its instructors had to pass the severest tests made by government inspectors. Your training is insured in advance.

Become a Member of the Famous Art Goebel Flying Legion

Your diploma entitles you to a membership in the Art Goebel Flying Legion composed of graduates of the Goebel School working together for their common interests. Handsome insignia pin identifies members.



The Only School That Gives You a Course in Aeronautical Salesmanship

The Art Goebel School of Flying not only teaches you how to fly but also gives you a course in Salesmanship which enables you to make your flying ability pay cash dividends.

You Learn to Fly on a Private Flying Field

The Goebel Flying or Training field is privately owned and is located at Liberty, Mo. It also has been approved and licensed by the government. This field is free of all possible hazards or obstructions which might interfere with take-offs or landings. The school buildings are located on the Kansas City Municipal Airport.

REMEMBER—

You Must Act Quickly!

This offer is good only for two months from the publication date of this magazine. Send in the coupon today!

FREE Air Transportation To Kansas City

Here's another big saving. Those who accept this wonderful proposition will be brought from their homes to Kansas City by plane.

THE ART GOEBEL SCHOOL OF FLYING

KANSAS CITY, MO.

The Art Goebel School of Flying,
Dept. B, Municipal Airport,
Kansas City, Mo.

Gentlemen: Please send me:

☐ Complete information and details of your offer of a 50-Hour Flying course, Salesman's Course and FLEET plane.

☐ Complete information of your Flying Courses without the Fleet plane offer.

(Check the offer in which you are interested.)

Name ____________

Address ____________

City ____________ State ____________

Sorry, but we must mention Lindbergh . . .

HE FLIES WITH CO-VE-CO!

BECAUSE it is the best, Lockheed selected Co-Ve-Co aircraft plywood for Col. Lindbergh's new low wing monoplane! . . . And why is Co-Ve-Co plywood superior? It is stronger. It is cut from logs just as they come from the forest, cold and unsteamed. Thus each square inch is uniform in quality for there are no bursted fibres. Co-Ve-Co aircraft plywood presents the most stubborn resistance to moisture absorption. It serves equally well under all climatic conditions. . . . You, too, should use Co-Ve-Co aircraft plywood. It can be precision manufactured to meet your specific needs, or it can be delivered in standard sheet sizes and thicknesses. Co-Ve-Co is manufactured both from Port Orford Cedar and Sitka Spruce. Communicate now with our sales representatives for details and samples.

PORT ORFORD CEDAR PRODUCTS COMPANY
Marshfield, Oregon

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CALIF. PANEL & VENEER CO.
955 S. Alameda Street
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Exclusive Sales Representatives
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H. B. MARIS PANEL CO.
735 Third Street
San Francisco

"...It's Not a KINNER MOTOR!"

If replacement parts other than those manufactured by Kinner are installed in your motor, *then it is no longer a Kinner!* ◆ This warning is issued for the protection of the rapidly increasing number of pilots flying Kinner-powered planes! ◆ There is an Authorized Kinner Parts Dealer located on practically every major airport in the United States. Genuine Kinner Parts, manufactured to Kinner standards for quality, precision and balance, can only be secured from him. Kinner parts purchased from him assure the continued, dependable performance from your motor to which you are entitled. ◆ Write direct to this factory immediately and we will send you the name and address of your nearest Authorized Kinner Parts Dealer. When writing give your name and address, make of your plane and the number of your motor. You will then receive all bulletins, covering the care and operation of your motor, without charge.

KINNER

AIRPLANE & MOTOR CORP. GLENDALE, CALIF.

UNHEARD OF ECONOMY

WATCHFUL economy is imperative at present flying school rates. A 30% saving in hourly flying costs may easily insure the financial success of your school. Even though you have full equipment, there are money-making reasons why you should consider making the Aeromarine Klemm AKL-25 standard on your field.

For, with its unheard-of economy of operation (30% below that of the average training plane), go all the superior qualities of one of the world's most popular and successful light planes for training and for sport flying.

Born as a glider—the AKL-25 flies itself. Powered by the famous, dependable Salmson 40 horsepower, nine-cylinder radial—or by the equally well known, sturdy LeBlond 60 horsepower, five-cylinder, radial engine (*) . . . these planes are built to stand rough handling and to win friends for your school by their ease of control. Department of Commerce Approved Type Certificates Nos. 121 203 and 204.

(*) For primary training, the AKL-25 powered by the Salmson 40 h.p. engine, sells for $3350, flyaway, Keyport, N. J.

For secondary training and for cross-country work, the AKL-60, powered by the LeBlond 60 h.p. engine, sells for $3500, flyaway, Keyport, N. J.

Equipped with pontoons and powered by the LeBlond engine, the AKL-60 sells for $4500, flyaway, Keyport, N. J.

AEROMARINE KLEMM CORPORATION

PARAMOUNT BLDG. · 44th STREET AND BROADWAY · NEW YORK CITY

To the left:
The passenger may sit in ease and comfort or move about with complete freedom; his Quick-Connector Air Chute instantly available in case of emergency.

Below:
Note the ease and comfort with which the passengers sit in this new Irvin Form-Fitting Pack.

Irving Announces

TWO NEW PACKS

Quick-Connector

Prominent aeronautic authorities state that this new pack is the most important parachute device offered during the past ten years. When equipped with the Quick-Connector type of chute, you wear only a comfortable harness while in flight. The Air Chute is carried separately in a Quick-Connector Pack, always within easy reach. In emergency it is only necessary to grasp the pack and place it against the chest. This pack is already adopted as standard equipment by several governments.

Form-Fitting
(CHAIR-TYPE)

This new Form-Fitting Back Pack can be incorporated into the back of the airplane chair. When thus used, the pack remains at all times in the chair, the harness being conveniently arranged so that passengers merely seat themselves and thrust their arms into the harness. They enjoy all the ease and comfort of a finely upholstered chair, with the added protection of a reliable Irvin Air Chute should emergency arise.

These chutes represent but two of the five different types of Irvin Air Chutes, available in all parts of the country. If there are no dealers near you, write to us for full particulars.

* * * *

Dealers should communicate direct with the company.

IRVIN *The Life Preserver of the AIR*

IRVING AIR CHUTE CO., INC., 372 PEARL STREET, BUFFALO, N. Y.

Our Motion Picture "Happy Landings" on standard width film, illustrating actual operation of the Irvin Air Chute is available free of charge to schools, clubs and organizations interested in aviation. Send for booklet and particulars.

THE INDUSTRY'S STANDARD

Kelsey-Hayes aircraft landing wheels enjoy an outstanding popularity in the industry because of outstanding superiority.

These wheels are completely manufactured by the Kelsey-Hayes organization in a special department manned by experts who for years have studied aircraft requirements.

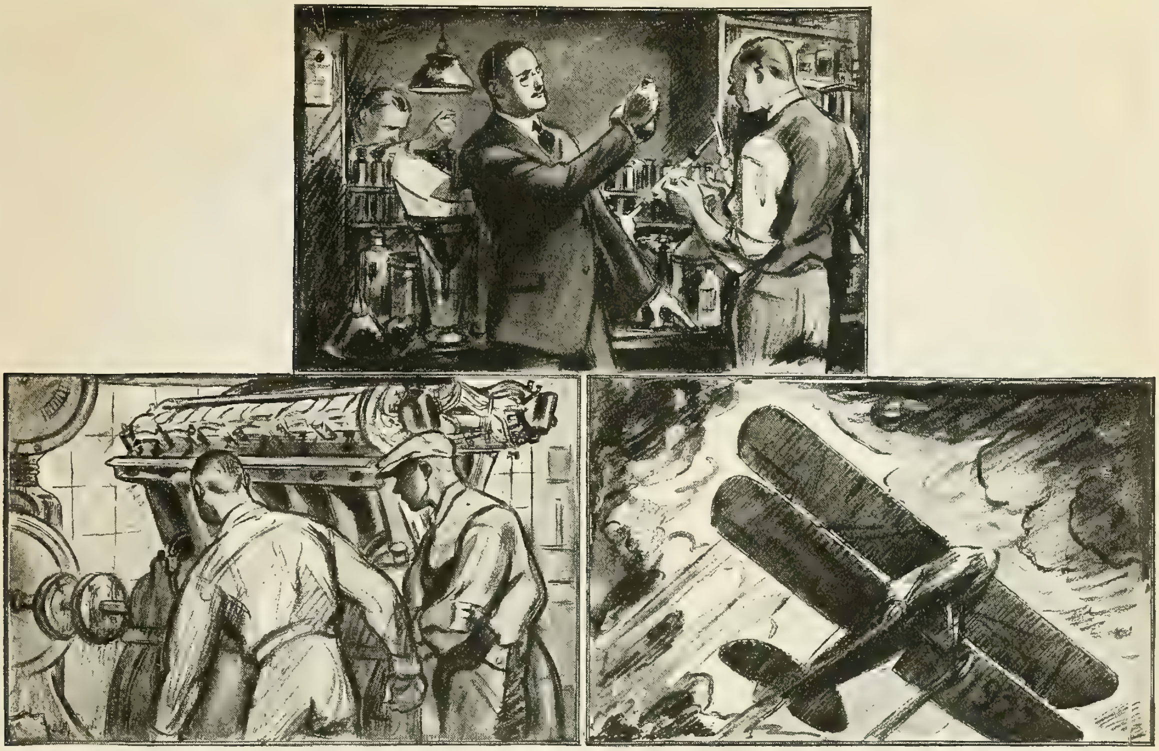
Kelsey-Hayes aeronautical engineers will be glad to study your problem and make recommendations.

Aircraft Division
KELSEY-HAYES WHEEL CORPORATION
DETROIT, MICHIGAN

Affiliated Divisions
Wire Wheel Corp. of America, Buffalo, N. Y.
Kelsey Wheel Company, Memphis, Tenn.
Kelsey Wheel Company, Ltd., Windsor, Ont.

KELSEY-HAYES

AIRCRAFT LANDING WHEELS



LABORATORY, TEST BLOCK AND FLIGHT

By every test -TP- Aero Motor Lubricating Oil plainly demonstrates its superiority. It represents a great stride ahead in the science of lubrication. -TP- eliminates many causes of engine trouble—reduces the risks of flying.

-TP- Aero Motor Lubricating Oils are new—the latest development in scientific lubrication. They have been tested and approved by leading manufacturers of airplane engines and by many leading pilots. They are straight-run oils, not blended or compounded, produced from pure, paraffine-base crude by a process for which patents are pending.

This process has marked advantages over other methods. It removes all the paraffine wax, while preserving all the lubricating bodies in the crude. Elimination of the wax is responsible for its low cold test.

In terms of performance this means uniform viscosity at all working temperatures, minimum carbon deposit and ignition trouble from fouled spark plugs, easy cold priming, immediate oil pressure, perfect lubrication winter and summer, on the ground or at high altitudes—a maximum of safe flying hours.

A handsome, practical *Pilot's Log Book* sent free on request.

-TP- Aero
Valve Spring
Lubricant

Also
-TP- Aero
Rocker Arm
Lubricant

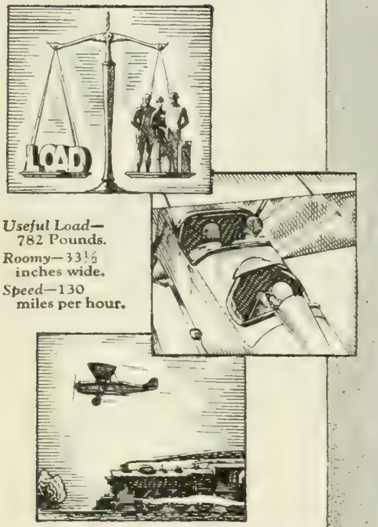
TEXAS PACIFIC COAL AND OIL COMPANY
FORT WORTH, TEXAS
New York St. Louis Los Angeles

-TP- AERO MOTOR LUBRICATING OIL

REG. U. S. PAT. OFF.

2778

» A GREATER AMERICAN EAGLE LINE THAN EVER BEFORE



Useful Load—782 Pounds.
Roomy—33½ inches wide.
Speed—130 miles per hour.

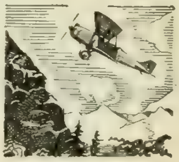
BECAUSE of its noteworthy ability to build dependable, rugged and speedy airplanes — and its desire to not only keep abreast of the times, but to lead in advancing new designs—new factors of comfort and safety, American Eagle Airplanes have become leaders in the Aeronautical industry.

And now American Eagle introduces the 201 Biplane, with Kinner power (shown below)—setting a new standard in flyability and giving performance which is a year ahead of the times.

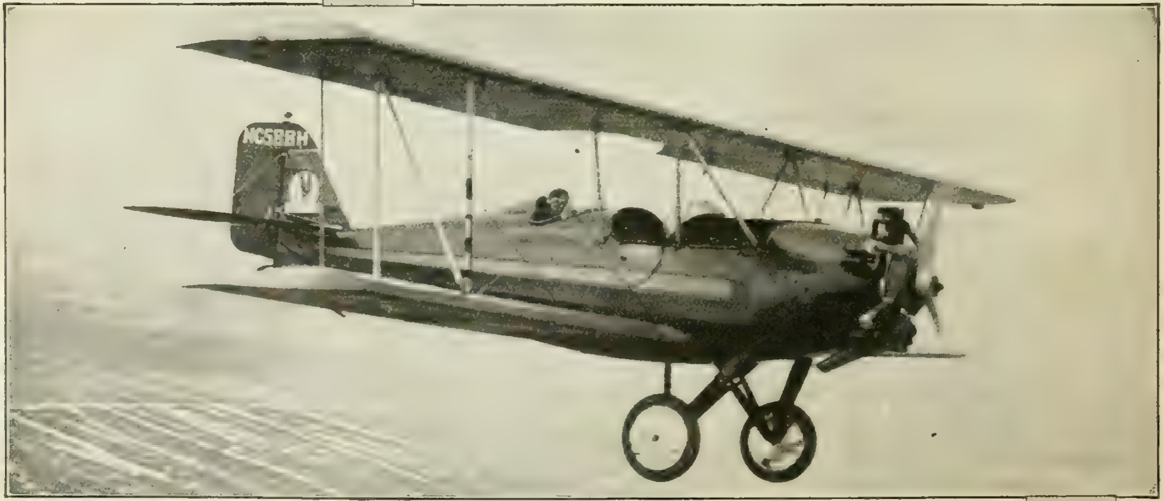
Its ability to travel 130 miles an hour at full throttle with a full load and to cruise at 115 miles an hour with the same load makes it a plane which will be in great demand. The American Eagle 201 takes off in 75 feet and lands at 30 miles an hour with full load. It climbs 750 feet the first minute, fully loaded. The wing curve used gives a high lift characteristic and surprisingly high speed.

A new roominess in the cockpit—a new beauty of design—new factors of safety and comfort—all of these and many other important refinements mark this plane as one of the outstanding achievements in aircraft construction.

Full information will be sent you upon request. Be sure to investigate this remarkable airplane.

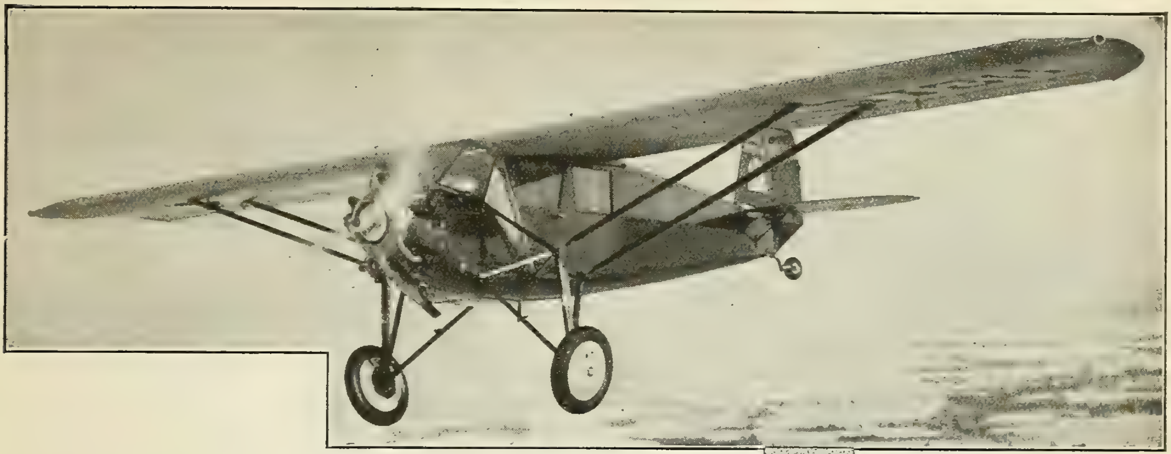


Rate of Climb—610 feet per minute.



FREE FLYING LESSONS . . . .

A short time ago American Eagle announced flight instruction would be offered FREE to a limited number of purchasers of American Eagle airplanes at retail. Naturally such a liberal offer must be limited, however, the time limit has again been extended because of the large number of requests which have come in for reservotoins. Write or wire today for full information.



MANUFACTURING A COMPLETE LINE OF AIRCRAFT UNDER 6 APPROVED TYPE... CERTIFICATES.....

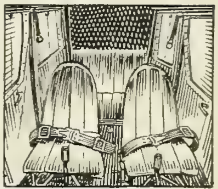
American Eagle's new four-place folding wing cabin monoplane, Model D-430, is the last word in aircraft! It is the roomiest, most comfortable four-place enclosed plane on the market.

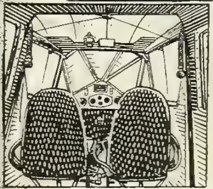
With a 1,022-pound useful load, the plane develops 142½ miles an hour top speed and cruises at 115-120 miles an hour. It otherwise has exceptionally high performance.

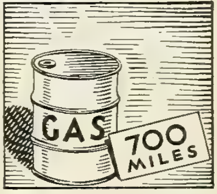
Twenty-two and a half square feet of triplex glass gives utmost vision. There's no backseat riding with knees in the pilot's back. The American Eagle 430 is as roomy as your auto! Three doors, two forward and one right rear, offer additional convenience.

Powered with the Wright Whirlwind Five, the American Eagle 430 possesses exceptionally high performance. It is to be offered with motors ranging up to 225 horsepower.

This is an exceptionally fine airplane—and at a price which will prove unusually attractive. It will appeal to private owners; to operators and to business firms desiring to keep pace with the times in rapid transportation of their officials and representatives.







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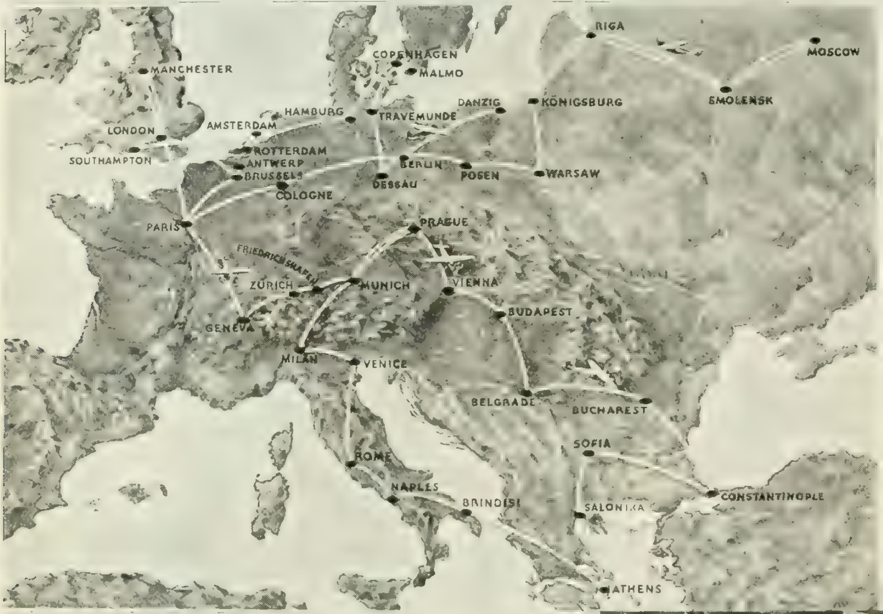


The Ford Plane

The Ford plane is planned, constructed and operated as a commercial plane. Built of corrugated aluminum alloys, it has great structural strength, unequaled durability, and is most economical to maintain in operation. The uniformity of its material is determined by scientific test. All planes have three motors in order to insure reserve power to meet and overcome all emergencies. The engines may be Wright or Pratt & Whitney, air-cooled, totaling from 900 to 1275 horse-power. Ford planes have a cruising range of from 580 to 650 miles at speeds between 55 and 135 miles per hour. Loads may be carried weighing from 3670 to 6000 pounds.

The capacity of these planes is 13 to 15 passengers and a crew of two (pilot and assistant). Planes can be equipped with a buffet, toilet, running water, electric lights, adjustable chairs.

The price of the Ford tri-motored, all-metal plane is exceptionally low because of its highly scientific methods of commercial production. Price is $42,000 to $55,000 at Dearborn.

Ford branches will be glad to give you information on the Ford tri-motored, all-metal plane in all models.

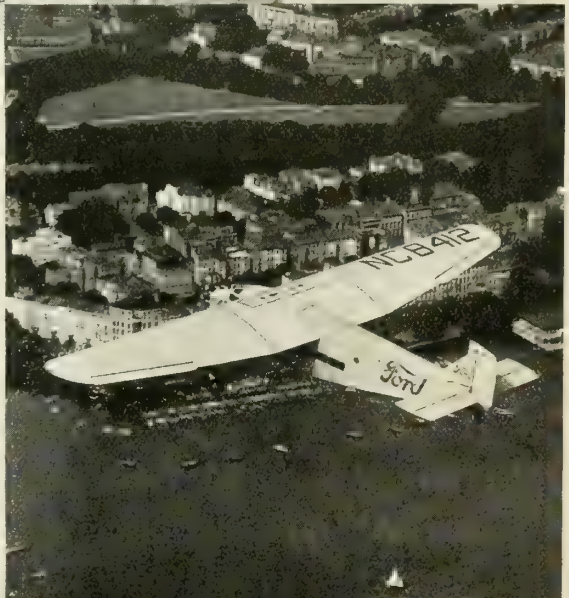
European aviation experts and newspaper correspondents refused to believe that the Ford Model-5AT all-metal, tri-motored plane that recently flew over Europe was a stock job. This plane, so familiar to Americans at home and in South America, amazed them by its unusual maneuverability and performance.

It was a feature of the London Show. Despite the fact that hundreds of commercial planes of all sorts are flying efficiently on airlines all over Europe, the arrival of the big Ford plane was everywhere an event of spectacular importance. Its strength, beauty, efficiency, gleaming cleanliness, and extraordinarily complete equipment astonished the European operators. Facing every variety of terrain, climate, and flying conditions this plane traversed 8915 miles over Europe, visiting almost every country on the continent, demonstrating its efficiency. As many as three countries were visited in one day. A total of 3757 passengers were taken into the air.

Having experienced no trouble whatever with engines or plane throughout the tour, this Ford plane was sold to a Czecho-Slovakian airline after demonstrating its ability to climb with full gross load at the rate of one thousand feet a minute.

FORD MOTOR COMPANY

Visitors are always welcome at the Ford Airport at Detroit



The big American transport over Hamburg on the Elbe

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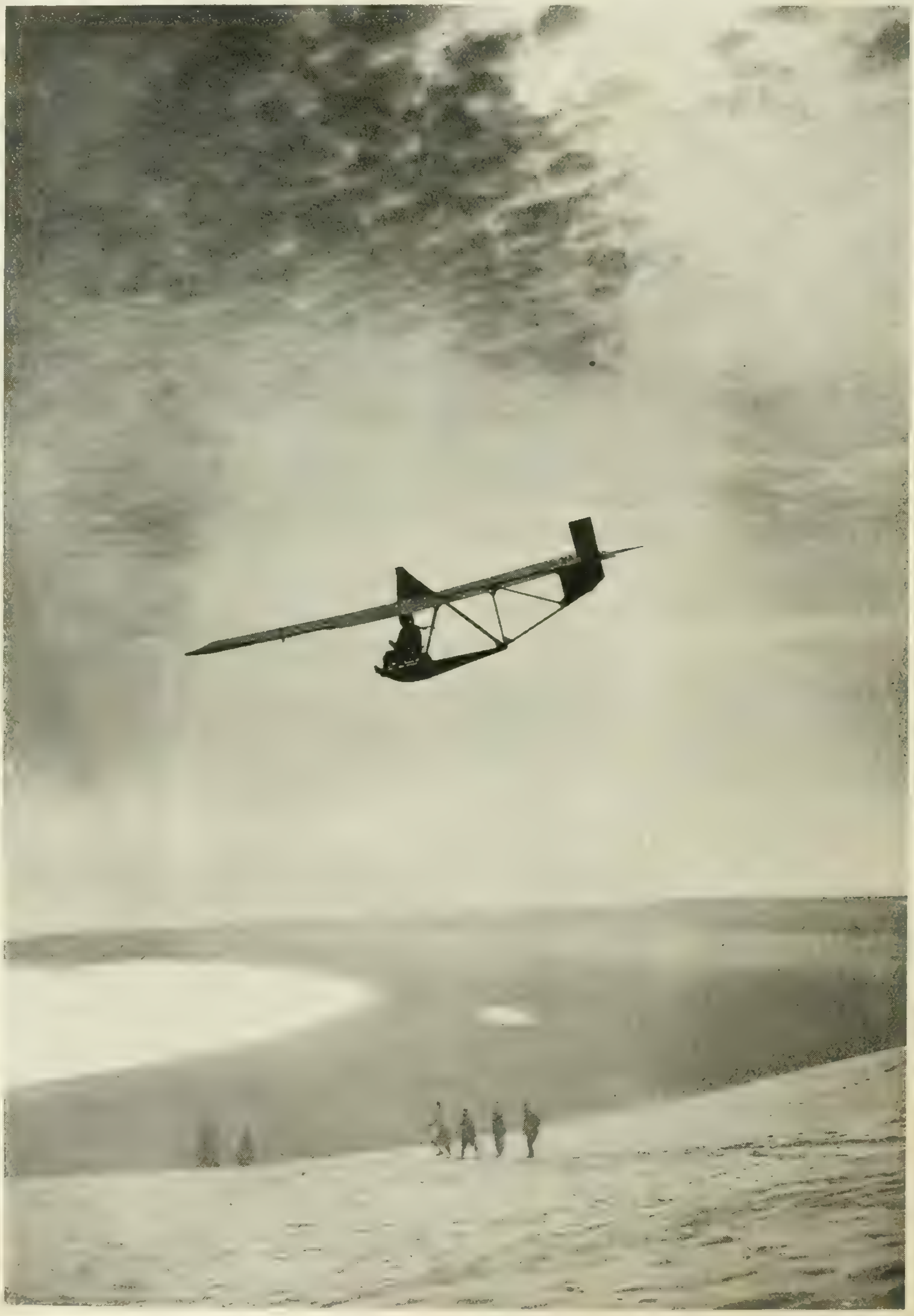


Photo courtesy of John E. Pratt

A primary training type glider taking off from the Pilkoppen sand dunes, Rossiten, East Prussia. Note the falling shock cord launching rope which has just been released.

GLIDING—AN INSTRUCTIVE SPORT

By Captain Frank M. Hawks

Superintendent, Aviation Division

The Texas Company

ONE phase of aviation which up to a few years ago received comparatively little attention in this country, although tremendously popular in Europe, is the manipulation of motorless airplanes, known as gliding. For efficient instruction of student aviators, for remarkable safety in flight and for sheer, downright sport, there is nothing which can compare with it.

Gliding presents several distinct features and advantages: It is fundamentally right; that is, it teaches the elementary principles of flight correctly and develops a technique on the part of the student that is far superior to the instruction gained from the first few hours in motor-driven planes.

Of more far-reaching importance, gliding is safe. The proportion of accidents in gliders is almost negligible and injuries received have rarely ever been fatal. This is because the absence of the motor causes the glider to float gently to earth, even when out of control; whereas powered aircraft under these conditions, because of the weight of the engine in the nose, immediately go into a dive.

On his first flights in a glider, the student is pushed only a few feet into the air. This suffices to give him the feel and general conception of how a plane acts when in flight, and by a gradual stepping-up process, he soon completes his tests. Moreover, he develops at the same time a firm basic knowledge of the subject.

Frank M. Hawks

By no means the least of the attractions of gliding is that it is a great sport and an inexpensive one. A good glider costs only about $500, as against $2,000 or $3,000 necessary to purchase a plane. A program providing for glider clubs throughout the United States, properly organized and effectively put over, would do much to popularize flying. The subject will be absorbed by those interested in flying as a sport, who will unconsciously become air-minded and well-informed on the subject of aeronautics. This will likewise contribute toward the sale of power-driven aircraft, because it is only natural that the next step after gliding is the airplane itself.

It might be interesting to readers for me to outline briefly the three steps in mastering the art of gliding: First, the student goes aloft in a primary machine, where he learns the function of the controls laterally, longitudinally and directionally. He is catapulted into the air from small hills and makes consecutive flights, each time to a greater altitude as his skill increases, until he is able to maintain flight for thirty seconds.

For the next step, the student transfers to a secondary machine, of lighter construction and greater wingspread which permits a longer stay in the air. With this machine, he must demonstrate his ability to remain aloft at least one minute and a half, and he must learn to make right and left hand turns. Having accomplished these, he is placed in a soaring machine, which is the most advanced type of glider. On this soarer, he is required to remain in the air for at least fifteen minutes.

When the glider pilot has reached the soaring stage, he has a very thorough knowledge of how to make good take-offs and landings, and how to bank and turn. He understands the stalling angle—that is, the angle at which a plane's controls will no longer function—and has automatically become familiar with the air currents which either help or hinder his remaining aloft.

Some remarkable records in soaring have been attained. Pilots have remained in the air for more than fourteen hours and have covered lineal distances exceeding a hundred miles. This not only indicates great skill on the part of the pilot but gives evidence of the contributions which have been made to aviation by the designer and manufacturer of the gliding and soaring machine.

Consideration of the above facts has brought out only the instructional advantages of gliding. I have said little about gliding as a sport. The novice receives the thrill of his life on his first flight of thirty seconds, and one may easily realize his sensations at being able to remain aloft for fifteen minutes, later on in the course of his instruction.

Gliding has many ramifications and offers a great field for development. Personally, I am decidedly convinced of its value and never fail to grasp the opportunity to fly a glider whenever it is presented.

At the recent National Air Races held in Cleveland, I made several demonstration flights in gliders, and in addition, was fortunate in winning the motor pilots' gliding derby. The latter was a contest open only to motor plane pilots. The object was to remain aloft for the longest period of time and land on a given mark. The contestants were towed into the air by a 500-foot cable attached to an automobile. The automobile ran across the field at twenty-five miles an hour to a designated spot. It was up to the contestant to gain all the altitude he could in that run and then cut loose to make his free gliding flight. The winning time was one minute and forty-five seconds in the air from an altitude of 400 feet, and the landing was made within thirteen paces of the mark.

It was a delightful contest, and my friendly opponents, Casey Jones, "Speed" Holman, Amelia Earhart, Lieutenant Boyden and Reed Landis, all expressed themselves as I have—that it is a great sport and affords tremendous possibilities to the youth of our country.

I was eager to continue making glider flights, and through the courtesy of Bill Scripps, president of Gliders, Inc., of Orion, Michigan, I was given the opportunity of making a flight in a glider from Pontiac to Cleveland. This was accomplished by fastening a 500-foot cable to an airplane. The glider was towed the entire distance, 160 miles, in that manner.

The photograph accompanying this article gives some idea of the beautiful scenery, both above and below, encountered on the flight. We arrived over Cleveland at about 3,000 feet, where I cut loose from the tow rope and began

Captain Hawk's glider being towed cross-country by airplane from Pontiac, Michigan, to Cleveland, Ohio

the free glider flight, which lasted about twenty minutes.

While soaring, the glider attains a speed of only eight to ten miles an hour, and I greatly enjoyed watching the activity of the crowds below while flying about serenely in this engineless little machine. Moreover, keen interest in the glider was evidenced by the crowd, despite the counter-attraction of Colonel Lindbergh and the Navy High Hats, who were doing all sorts of wonderful stunts at the same time. This would indicate that the public is looking forward to new and interesting phases of aviation and that the time-worn stunting program is doomed to pass.

The glider I used on the cross country flight was of the "secondary" type, having a plywood covered fuselage and parasol-type wings braced with two struts on each side.

While the airplane towing method of gliding is of course one of the most interesting and spectacular, it requires a great amount of skill and should not be attempted except under careful supervision. There are many points to consider in connection with towed flights, such as propeller wash from the towing plane, bumpy weather, critical flying speeds, coordination of the flying speeds of the two dissimilar craft, etc.

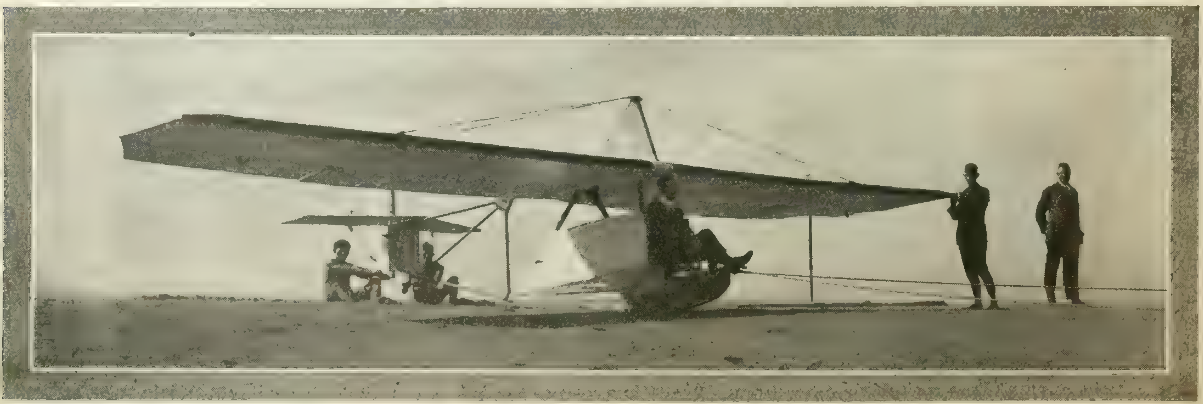
Hawks taking off for a motorless cross-country trip

It is particularly gratifying to note the interest developed in gliding by young boys, and it is a pleasure to mingle with youngsters from twelve to fifteen years of age who make very remarkable flights in their tiny machines. These Young men are receiving splendid instruction and are achieving what I consider the best possible foundation work in their study of aeronautical science.

The aviation industry has long been convinced of the theory that, to be made successful, air transportation must be made popular. To be made popular, flying must be placed before the public at reasonable cost, and above all, must be made safe.

One means by which this can be accomplished is to stimulate interest in gliding. I should like to see this sport sweep the country like the bicycle craze of the nineties, for in many ways it can be compared to bicycling.

Once aviation is familiar to everyone, it will be no more feared than traveling by automobile or by train, and the day when the average citizen drives his own plane will be much nearer to practical realization.



Ready to launch a German Zoegling primary training type glider by means of the conventional rubber shock cords

THE SIGNIFICANCE OF GLIDERS

Considerations Influencing the Development of the Alexander Trainer

By J. Don Alexander
President, Alexander Aircraft Company

AN airman's first hop in a good glider convinces him of its possibilities as a public educator. The airplane has won its place as a superior vehicle. It remains for the general public to accept the air as a superior medium of travel. To a large number of people, gliding will prove an excellent stepping stone. It will fill a definite need in the industry. The bicycle never was given proper credit as a trail blazer for the automobile, but it played an important rôle.

Gliding overcomes any distrust of the air as a solid and steady supporting medium for a speeding airfoil. It teaches the principles of flight and does away with much of the mystery of flying in John Layman's mind. Everyone knows that gliding is easy on the pocketbook. It has every attraction that will introduce thousands of the present and younger generation into the air, if properly promoted.

Ultimately, as every veteran airplane rider knows, the air will be generally recognized as the logical medium of cross-country travel. Perhaps after all that was one reason it was put there. We are just awakening to the fact. The glider will help stimulate this awakening.

The first reaction to gliding is surprise at the ease of it. A small group of Alexander factory workers built a primary glider on their own time late in 1929, and every young man who participated in its construction flew the machine successfully, although none had ever before left the ground alone. Officials of the company tried gliding. It was a revelation. It led us to take up the manufacture and sale of gliders.

The Alexander Glider Club's machine, however, left a great deal to be desired. Its wooden construction apparently could not stand up under occasional rough treatment. The Colorado Springs altitude of 6,200 feet cut down the buoyancy about twenty per cent and brought some disappointments.

Prior to that time gliding had, to our knowledge, never been attempted in the Rocky Mountains. We decided to pioneer high altitude motorless flight and develop a glider with a wing loading light enough to combine the characteristics of a primary and secondary type glider. There is, I believe, no good reason for building or buying a distinct type of glider for each stage of gliding. Conservative methods of launching will make the semi-soaring glider a safe and reliable machine for primary instruction and later provide better training and amusement for its owners. Despite the rarified air, the first factory-built glider showed good ability to gain and hold altitude for a long time above the hillside point of launching.

Continuing this program of dual-purpose gliders, our engineers next designed a two-place training glider which with one pilot should have a sufficiently light wing loading and clean structure to soar. I believe the dual-purpose idea will be the inevitable trend in glider building. We plan to test the two-place machine soon.

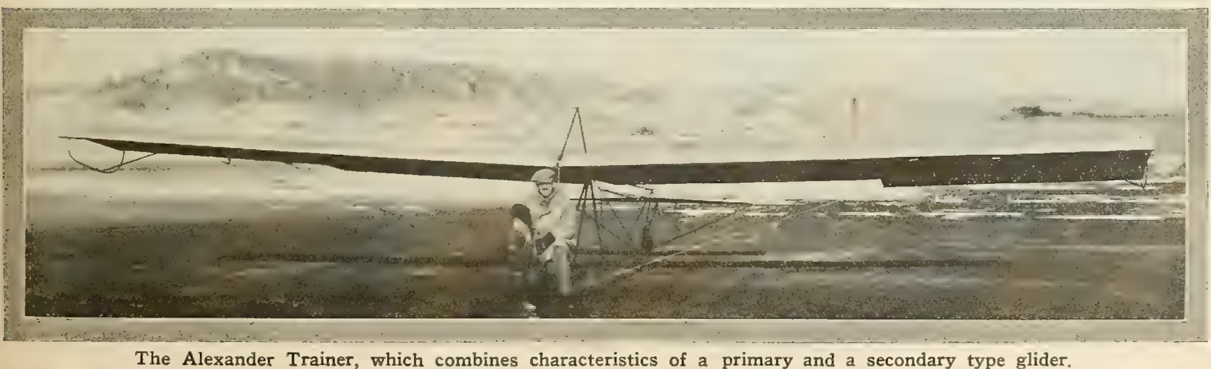
As in airplane construction, unusual strength and lightness were obtained in the first Alexander primary glider through use of welded steel tubing in the fuselage. To insure a light wing loading, the engineers designed approximately 200 square feet of high-lift wing area. The research department built several gliders of varied design and tested them by towing and catapulting. Factory machines showed a fifty per cent improvement over the first effort of the Alexander Glider Club. It was evident that a home-built machine cannot compare with a factory product, even though the builders are trained in aircraft construction and are afforded machinery and materials.

Factory tests showed the need of a large amount of wing area, unusually large rudder and aileron surfaces, and an airfoil which would give good lift but would not burble sharply when stalled, as do many high-lift airfoils. Builders of a primary or secondary glider should never lose sight of the fact that their machine must be flown over a long period by novice pilots without damage, or the glider movement suffers.

Because large control surfaces are needed to preserve sensitivity at slow gliding speeds, rudder, ailerons and elevators were made proportionately larger than on an airplane.

The need of a slow burbling airfoil became apparent when we began hillside catapulting of pilots who had not had previous experience. The majority of beginners found no difficulty, but others forgot instructions, and, distracted by the sudden acceleration, hauled back on the stick and stalled the glider. When stalled, one of our first experimental gliders would fall off sharply on one wing. Broken wing tips resulted, in every instance the damage was confined to the glider; it did not fall hard and the long prow jutting between the pilot's legs and the two wing tips preserved him from contact with the ground and possible injury.

Confronted with this problem, the engineers studied methods for "fool-proofing" the glider as nearly as any machine can be fool- (Continued on page 219)



The Alexander Trainer, which combines characteristics of a primary and a secondary type glider.

SLIDING ROUND THE SKY

By Don Rose

IN the days when the railroads were still the chief means of transportation and not just the raw materials of which mergers are made, there were sometimes accidents in which people got hurt. A number of schemes and devices were developed to correct this condition, some of which worked and some of which put their proud inventors in the poorhouse or the lunatic asylum. Possibly the best of them was based on the fact that most collisions consisted of one train running into the rear end of another, and that in such unfortunate misunderstandings the passengers in the rear coach were most likely to be damaged. So some genius, whose name is now lost forever in the fog of the past, suggested the obvious remedy of leaving the last coach off the train and thereby reducing crash casualties to a minimum.

A careful contemplation of the hazards of aviation, as revealed in mortality figures and the second thoughts of newspaper reporters, reveals a similar outstanding defect in the system and a way to remedy it. A number of accidents appear to happen because airplanes have motors. After a few million miles or so, an airplane engine may pause for breath or otherwise forget itself, after which it is up to the pilot and the prayers of the air-minded. Therefore, in my earnest desire to contribute my mite to aeronautical progress, I worked out the idea of dispensing with the motor.

But while I was still looking around for an honest patent lawyer, and a kind but not too critical financier to back my big idea with a few hundred thousand dollars of ready cash, somebody stole it from under my nose. Without a word of thanks or acknowledgement and with no suggestion of paying me even a nominal royalty, the brethren began to betake themselves into the air in motorless planes, very much like the ones I had in mind. They began to slide around in the air without any visible means of support and without any pleasing "putt-putt" from an engine out front. And—just as I expected—none of them have so far got into any sort of a crash from motor failure.

By a great effort of generosity and self-sacrifice, I have managed to refrain from bringing suit against anybody for infringement of my patent, particularly since I didn't have a patent. But I have watched with keen personal interest the progress of gliding, as a sport, industry, experiment or simple device for keeping a pilot out of worse mischief. Perhaps it is going too far to speak of the progress of gliding. Most of the gliding done to date hasn't got very far, though it has sometimes spent a long time trying to. But there's no doubt that sliding around the sky on about half an airplane, with nothing to keep you there but your wits and the weather, is a game that has a good many possibilities beside the one of keeping Colonel Lindbergh's name in the papers.

I foresee, for instance, its ultimate effect on American home life. When father comes home a little late, for reasons which don't concern us here, his natural desire to explain things will have a new way out.

"My dear," says he, "I'd have been home two hours ago, but a chap in the next office told me about a short cut and I thought I'd try it. He said I should take off into the river breeze and then turn sharp at the pickle factory, slide up to a thousand feet over the ball park and coast down past the poorhouse to where the six o'clock breeze comes down the valley. That way you miss the commuter's crowd over the railroad sheds and can sometimes pick up a nice upwind from the glue factory. But I hit the traffic light wrong over city hall and had to swing out over the cemetery, and then a cloud came along and cut off the up-current I was counting on, and I had to go out over the river again. And you know what the river does to a single-seater like mine.

"Well, I made a neat turn over the iron works and picked up a hundred feet or so from the blast furnaces, but I lost it again over that long stretch of railroad yards. I thought I'd have to put her down, but just caught the five o'clock whistle from the round-house, which blew me up a full thousand feet. But there the air just died on me. I hung around a bit and rode a while on the slipstream of a mail plane, but didn't make no real progress. There was just nothing stirring up there. Why, at last I had to go across to Camden to get a breath of air, and come home by way of the soup factory, with a little boost from the airport which gives you a good push when the sun shines on it. It's a good thing they put up that new apartment house over at the edge of the park. There's a nice up-current there, and if you make it right you can slide right down to our back yard."

"Humph," says the wife. "So you had to go over to Camden to get a breath of air! Well, you certainly got it."

"Got what?" says he.

"A breath," says she.

That sort of thing will be just one of the consequences of this new habit of gliding. You can see for yourself it has very practical possibilities. I've been trying to prove the point ever since Lieutenant Barnaby walked home from the *Los Angeles* on a glider which weighed not much more than himself. Those of us who live in the neighborhood of Philadelphia and consider the *Los Angeles* our personal airship got a lot of fun out of that performance. The lieutenant himself said it didn't amount to much, but we reserve the right to disagree with him. Anybody who takes the first chance on a new act should be given a hand, even though he does it so well that it looks easy.

The real point of the performance, of course, was that it suggests all sorts of ways in which the gas-filled airliners can overcome some of their natural limitations. One of the weak spots in the lighter-than-air program is that airships are so thundering big that they are an infernal nuisance whenever they want to sit down. Getting an ocean liner into a dock on the Hudson River is a soft job compared to hitching an airship and making it stay hitched. An airship in the air is graceful, beautiful, manageable and maneuverable; it travels fast and holds its course, and usually stays right side up. A dozen men can take it where it wants to go, and its

(*Continued on page* 224)

THE NEXT TEN YEARS OF FLYING

Part II of a Prospectus by Some Leaders of the Industry

As Told To

Robert S. Clary

Chief Editor, Aeronautics Branch Department of Commerce

NOW let's jump in the nearest plane and hop out to Seattle, to interview W. E. Boeing. He is chairman of the board of directors not only of the Boeing Airplane Company and Boeing Air Transport, Inc., but also of Pacific Air Transport and United Aircraft and Transport Corporation. And what he doesn't know about flying could be written on an air mail stamp with a shaving brush.

Says he:

"Although a comparison of figures on planes produced and planes sold shows that the industry over-reached itself in 1929, more planes were sold last year than in 1928. Experienced manufacturers, with well financed and managed plants, together with a proper sales program, have reason to believe that the ground work on which the production of the next few years will be built is sound. Companies of that type can be expected to develop along logical lines.

"Certain immediate and obvious angles to the present situation, however, should be considered. There has been a tendency to finance new companies, in response to the awakened public interest in flying, without taking into consideration their earning possibilities and ability to compete in design or production, and without considering present limitations of the market.

"If we look, however, at the present ground work on which the industry must build, we discover a healthy general condition. There is a growing public interest in flying, and a larger appreciation of the fact that the airplane has proved itself a dependable and necessary unit of our national scheme of transportation and communication.

"Happily, the public is rapidly ridding itself of the impression that flying is romantic, spectacular, or heroic.

"Business men have been the first patrons of each new form of transportation, and history is now repeating itself. The substantial investments being made in terminals in all parts of the country are a favorable sign of the times. To sell airplanes, we must have pilots to fly them. Last year there was a substantial increase in the number of students completing flying courses. The more stringent Department of Commerce regulations on flying schools will produce better fliers, with a consequent lowering of accidents resulting from poor piloting attributable in turn to inadequate ground school and flying school instruction.

W. E. Boeing

"Commercial aviation has been built largely around air mail, the growth of which is illustrated by these figures of total mail carried:

1918 ....17,000 pounds
1920 ...526,000 pounds
1927 .1,032,000 pounds
1928 .3,544,000 pounds
1929...8,000,000 pounds (estimated).

"The total distance flown by air mail planes in 1929 is estimated at 13,000,000 miles, contrasted with 7,670,000 miles the year before; and we now have a basic airway system on which we can expand operations as required.

"Airplanes which were thought to be fast enough and good enough a few years ago have now gone into the discard. Our Chicago-San Francisco operations illustrate this. Until last year, we had used five planes and five pilots in flying each mail load between Chicago and San Francisco. By doubling up the run of the airplane, our operations now call for only two planes to do the work for which five were formerly required.

"The unit cost of airplane transportation will decrease and performance will be steadily improved, while other forms of transportation have apparently approached maximum efficiency.

"This is a nation of great distances, and our people have a speed complex which makes conditions very favorable for larger use of the airplane. It should be remembered that no newer or faster form of transportation in this country has ever been rejected. Some have felt that this nation's air passenger service has lagged behind that in certain European countries, but there is evidence that we are building on a substantial basis for the extensive air passenger business which is to be developed; and it is important to note that we are doing this without benefit of subsidy such as is enjoyed by European companies.

"It is logical to expect larger use of the airplane for air express; for it is estimated that approximately one million shipments are sent via train express every twenty-four hours, to secure delivery three times as fast as train freight. With the airplane three times as fast as train express, and traveling safely and swiftly both day and night, we have reason to expect that airplanes will carry substantial amounts of air express.

"Thus, a broad view of the situation reveals solid ground on which to build conservatively: (1) larger public appreciation of aeronautics, (2) more and better airports, (3) Government approval of a sound civil aeronautic program operated by private enterprise, with recognition of the usefulness of the airplane as an arm of national defense, (4) more flying students, (5) increased civil flying and commercial air transport, (6) increasing interest in passenger and express services, and (7) growing use of the air mail."

While we are in the West, let's interview Walter T. Varney, chairman of the board of directors of Varney Air Lines, Inc., and president of Varney

Walter T. Varney

Air Service, Inc. In addition to having the Government contract for operating air mail route 32 from Pasco, Washington, to Portland, Oregon, to Seattle and Spokane, Washington, his company also still holds the contract for C.A.M. 5 between Salt Lake City, Utah, and Pasco, Washington—via Boise, Idaho—which is believed to be the first domestic air mail line to be operated in the United States which is still in existence.

He can give us the operator's angle.

"It is impossible," he declares, "to forecast the effect that new inventions may have on the development of aviation in the next ten years, but we can at least anticipate what should occur as a result of refinements on the equipment we already have, where no new principle is necessarily involved. The automobile of today differs materially from that of ten years ago, but only in refinements arising out of practical usage; and that may very well be the case with the airplane in its future.

"Since I am concerned mainly with aviation as a means of transportation, I believe that the most important advance necessary at this time is the development of the ability to fly blind and thus defeat the greater part of weather difficulty. I believe that the slowness of growth in air passenger traffic is due to fear and to lack of faith in reliability of service, and not so much to the cost of such transportation. Americans willing to pay for speed are numerous enough to make possible the profitable operation of airlines, if the other factors are conquered. As far as safety goes, practically all accidents on regularly organized air transport lines are the result of bad weather conditions. This is not true in respect to non-transport operations, in which most accidents seem to be caused by faulty technique of piloting. Weather, of course, is also the bane of transport schedules.

William B. Stout

"'Blind' flying is premised on several developments: (1) stable airplanes, (2) development of proper instruments, (3) radio communication and radio directional beacons, and (4) properly trained pilots. None of these developments is impossible, and most are already at hand, awaiting the test of usage to make them entirely practicable so that they may be universally adopted.

Richard F. Hoyt

"This addition to the art of flying will not be made overnight nor will it burst on the public as a revolutionary thing; but slowly all transport lines will be doing it as a matter of course; fog accidents will decrease; schedules will be more nearly perfectly maintained, and many passengers will ride. The day of underfog piloting in bad weather, *must* pass if aviation is to arrive anywhere as a medium of transportation.

"Turning back ten years of aviation history, we find nothing of importance in practical use now that was not in its infancy then. The radial air-cooled engine was in existence, and the present low rate of mechanical failures in engine has evolved only from a long process of refinement. Similarly the modern fast, efficient, well-balanced airplane is and has been progressively developing out of materials and designs the foundation and theory of which are not generally different from those of ten years ago.

"The American public is too apt to look for a panacea, a sudden over-night solution of all difficulties through a startling invention or discovery. This, in my mind, is not apt to happen—and should not at any rate be counted on.

"At present, outside of the carrying of air mail, commercial air transportation is not paying its way. I believe it will, eventually. I believe particularly that safe 'blind' flying must be achieved before passenger carrying can be entirely successful. If the transport lines can earn money, then the factories will get their orders, pilots will be trained, airways and fields be developed and used, experiments and new developments tried out under practical conditions, and the public educated to ride; but all this can be done only with air mail as the firm foundation for several years to come."

Now, on our way back East, let's land at the Ford Airport at Dearborn and see President William B. Stout of the Stout Metal Airplane Division of the Ford Motor Company. He was formerly chief engineer of the aircraft division of the Packard Motor Car Company, technical advisor to the Aircraft Board during the war, and designer and builder of the first internally trussed airplane flown in the United States.

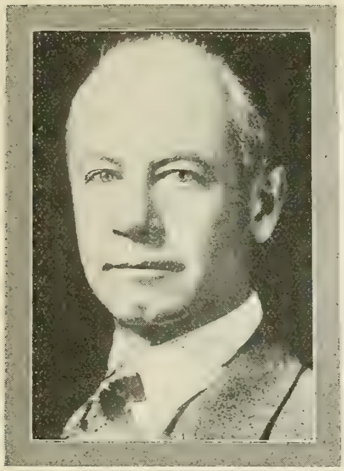
Says he:

"No matter how visionary any man may be, he cannot picture a fraction of what will happen in aviation in the next ten years.

"In the first place, the present type 'kites' will be gone, and the plane of the future will not even look like the planes of today. The airline transport plane of thirty or more passenger capacity will fly mainly at night. It will have accommodations, state rooms, lounge rooms, smoking rooms, diner. It will be entirely of metal, metals not used in plane work today. It will be capable of speeds averaging 150 miles per hour, with a landing speed anything desired from zero to the prevailing speed of the wind.

"Private-owner planes will be stamped out in quantity, and within ten years, will approach motor car quantities per year. At motor car production rates, a plane of equal capacity can be built even more cheaply than an automobile with the same carrying ability.

Edgar N. Gott



Graham B. Grosvenor

"We can look for a doubling of the airplane business every year for the next four years, in practically every field of endeavor. There will be little water flying because of its uncertainty and the lack of visibility over water, as well as the enormous upkeep costs of a hull compared with a fuselage and landing gear. Small boats and amphibions will be used in enormous quantities. Power plants will be entirely different from our present conception.—They will be made largely of beryllium or some similar alloy, and will begin to approximate a turbine principle.

"Anyone of normal intelligence, balance and vision will be able to learn to fly in the same time it would take to be able to drive and understand the motor car. There is just about one-tenth the mystery that the present aviators and promoters would like the public to believe."

Igor I. Sikorsky

Flying back over the Alleghenies, we find ourselves over Bristol, Pennsylvania, and decide to drop in on President Edgar N. Gott of the Keystone Aircraft Corporation. Born, reared, and educated in the automotive state, he was one of the original incorporators of the Boeing Airplane Company way back in 1915, when aviation was a very puny infant indeed. He has helped to nurse that industry along—first as vice president and general manager and then as president of the Boeing company, then as vice president of the Fokker Aircraft Corporation, and now as president of the Keystone Aircraft Corporation and of the Loening Aeronautical Engineering Corporation. Incidentally, as proof that he has qualified as a nurse for infant industries, he is now also vice president of the Curtiss-Wright Sales Corporation and director of several other aeronautical enterprises—notably the Airport Development and Construction Company, the Central Airport, and the Aeronautical Chamber of Commerce.

Predicts he:

"The next ten years should show development and refinement of what we have, rather than new and radical changes in design or operation. The design of an airplane is, at present, probably the most exacting scientific calculation known to engineering. The weights, speeds, altitudes, and flying characteristics can now be predicted within a very small margin by a competent designer. Because of this meticulous care which has been used in design and construction, structural failures in airplanes are now extremely rare.

"The furtherance of research toward fog and night flying, and increased reliability of power plants, will continue to make the airplane more and more safe as time goes on.

Anthony H. G. Fokker

"Existing airlines will be further consolidated, to the end that better service will be given the traveling public. Additional lines will be established wherever necessary. The public will be educated, consciously as well as subconsciously, to the realization that night flying can be made just as safe as day flying; and the hazards of the elements will continually be reduced.

"Comforts for passengers will be increased even beyond the point which now obtains. Before long, it will be possible, for instance, for passengers individually to keep in touch with the ground by means of the radio-telephone, and if necessary, thus to expedite their business and social appointments while in flight.

"I believe that the use of the private airplane *per se* will not grow with the leaps and bounds that have characterized the popularization of the automobile. I believe that the airplane is more a medium for organized commercial transportation rather than for the use of private individuals, although the private airplane will increase in popularity and will have a very definite and useful place in the every-day life of the ordinary citizen.

"As soon as the airplane becomes a prosaic every-day means of transportation, and ceases to excite the curiosity of the multitudes, then will it have taken it place as a definite factor in the transportation world. This era is rapidly approaching, and it will not be very long before the now hackneyed phrase 'air-minded' will be relegated to obsolescene, because of the fact that air-mindedness will be subconsciously a part of the mental process of the average man."

Back in New York once more, let's see what Richard F. Hoyt has to say. He is chairman of the board of the Curtiss-Wright Corporation, a banker, a graduate of Harvard, and a partner of the firm of Hayden, Stone & Company. During the World War he was first civilian assistant to Col. J. G. Vincent at McCook Field; later, secretary and assistant to the president of the Wright-Martin Aircraft Corp.; chairman of the board of the Wright Aeronautical Corp.; and member of a number of important committees, relating to national and international aeronautics.

"Never has there been any industry, arising in this or any other country," he says, "that has had the support of the Government and of the public as aviation has had during the past few years. Immediately after the war, the Army and Navy took care of our aeronautical enterprises and kept them alive with orders for military equipment. Then the Post Office

(*Continued on page* 230)

RADIO RECEPTION VERSUS IGNITION INTERFERENCE

By

Herbert Hoover Jr.

Radio Technician, Western Air Express

At the present time there is only one thing that is retarding progress towards the widespread use of radio in aeronautics, and that is ignition interference.

The Department of Commerce has built up an extensive system of weather reporting and forecasting that covers most of the major airways of the country, and it is providing over forty high powered radio telephone stations through which this information is broadcast at hourly or half-hourly periods. The manufacturers of radio apparatus have gone to a large expense to provide receivers that have been especially adapted for aircraft use. The transport companies are doing their utmost to insure maximum safety for their passengers and pilots by means of radio communication and navigation. In addition, many private owners are planning to install radio receivers in their planes during the coming season.

If a radio receiving set is installed in an average type airplane which has not been shielded against ignition interference, the range of reception is limited to between twenty-five and fifty miles. If proper precautions are taken to suppress this noise, however, the reliable range is increased to between 125 and 200 miles, and the sensitivity of the reciver is limited only by the static level. Inasmuch as it is not practical to locate the ground stations closer than 200 to 250 miles apart, a reliable receiving range of at least 100 to 125 miles is necessary if airplanes are always to be in contact with the ground. The elimination of ignition interference is therefore the determining factor in how effective a part radio is going to play in future aviation.

The following discussion is based upon the experience of several transport companies using radio in experiments and flying operations extending over a period of a year or more. It is their desire to help other transport operators, private fliers and manufacturers of airplane equipment in making possible a more effective use of radio in aviation.

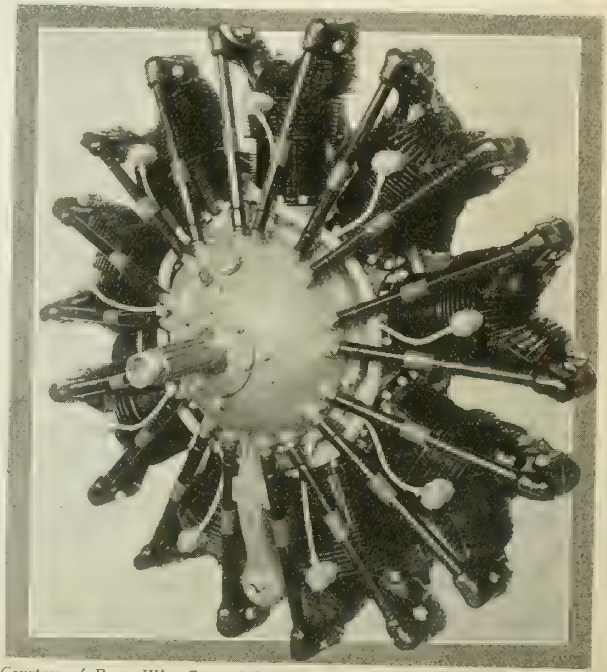
The problem of shielding against ignition interference has two general phases: First of all, many of the planes which are at present in use will have to be shielded in order to comply with the anticipated Department of Commerce regulations requiring the use of radio. This responsibility falls upon the transport operators, the flying service companies and also those private owners who, although not required to have radio, nevertheless wish to avail themselves of the additional safety which it affords. In the second place, all engines and planes which are manufactured in the future should, before leaving the factory, incorporate proper shielding as an integral part of their design. The responsibility here lies entirely with the manufacturers of engines and airplanes.

Before a discussion of the methods of shielding is undertaken, the causes of ignition interference should be clearly understood. Each spark plug in the engine is a miniature radio transmitting station. The ignition wires, magneto, low tension wires, and their associated parts, form an antenna system. Every time a spark occurs across any of the plugs a radio impulse is sent into this antenna, and a corresponding signal is radiated out into space. Inasmuch as the wiring of the plane is not tuned to any particular frequency, the spark interference can be received on virtually any wave-length from zero to infinity. Furthermore, spark transmitters are famous for the interference they create, even when working into sharply tuned antennas. If it is imagined, therefore, that a highly sensitive receiver on the plane is trying to pick up a feeble signal from a station which is perhaps 150 miles away, and only ten feet away are located from eighteen to seventy-two strong spark transmitters, feeding into an antenna which is radiating on all wave-lengths, a fair idea of ignition interference can be visualized.

In addition to the type of noise already described, it has also been found that the vibrating contact in the voltage regulator box of the battery charging generator will also cause considerable interference. Occasionally, there may be noise from sparking at the brushes of the battery charging generator or from the distributors of the magnetos.

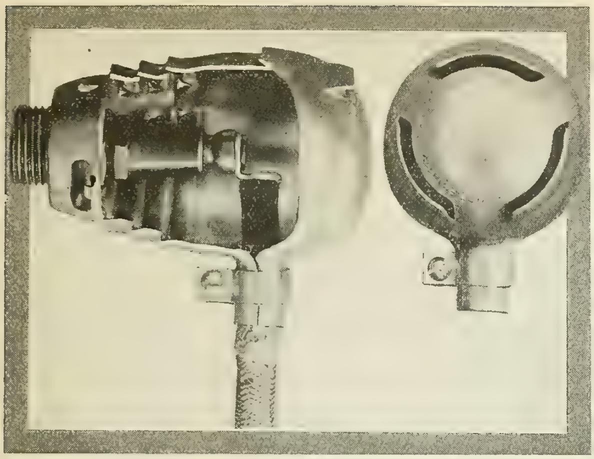
There is only one solution—all of the spark plugs, the high and low tension wiring, the magnetos, the booster magnetos or coils, the switches, the starters, the generators, the batteries, and all of their associated parts must be continuously enclosed in a grounded metallic shield. When this has been properly carried out, not a sign of ignition interference can be detected, and the full sensitivity of the receiver may be employed.

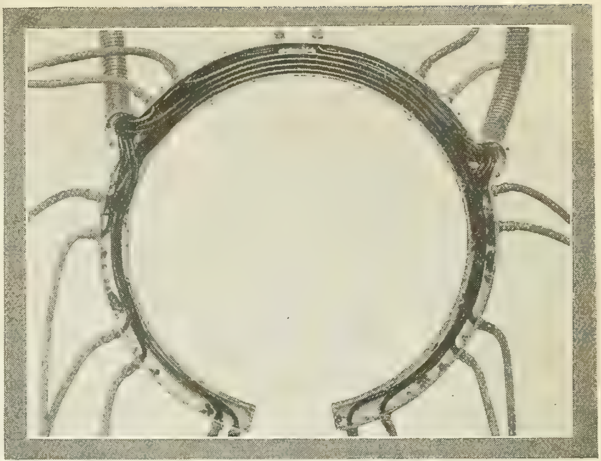
Generally speaking, the shielding that is required can be divided into two distinct parts. First is the high tension system comprising the plugs, the magnetos, the booster magneto or coil, and the switches in the pilot's compartment, together with the wiring joining the various parts together. The second is the low tension system, including the battery charging generator, the voltage regulator, the battery, the engine starting motor, the switches, and the wir-



Courtesy of Rome Wire Co. and Radio Freq. Lab.

Flexible type of ignition wire shielding, with spark plug covers attached, as installed on a wasp engine





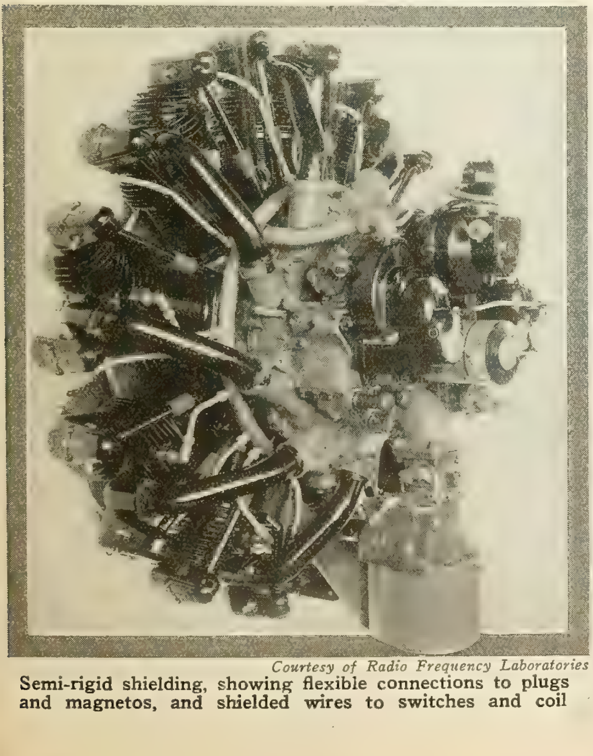
Courtesy of Radio Frequency Laboratories

Left, cutaway and end views of a shielding can for use with a standard spark plug; right, type of harness developed by Mark Swanson of Universal Air Lines. Aluminum top plate is removed to show arrangement of wires and system of assembly

ing that is required between the various units of the system.

The high tension system should be treated as a unit. There are several types of specially shielded spark plugs now commercially available, and also small covers or cans which can be placed over an ordinary plug. The latter are probably the most economical at the present time, although almost all of the spark plug manufacturers are experimenting in an effort to produce entirely new and improved types of shielded units.

The high tension wires from the plugs to the magnetos should be in a metal sheath, which in turn should be grounded about every twelve inches or less. Several makes of shielded harnesses are now available which can be easily installed without removing the engine from the plane. The manufacturers of magnetos have slightly changed the design of their housings in order to accommodate a metal shield over the connection blocks, and to provide a snug fit around the metal sheath of the harness as well.



Courtesy of Radio Frequency Laboratories

Semi-rigid shielding, showing flexible connections to plugs and magnetos, and shielded wires to switches and coil

Great care should be taken to shield the wires running from the magnetos to the grounding switches in the pilot's compartment, and to the booster magneto or coil. Insulated wire is now available with a woven metallic braid covering which is easy to install, and which if properly grounded, will provide good shielding. The magneto connections are particularly important from an interference point of view, because they form a direct part of the spark plug antenna system. It has been found that removing only a few inches of shielding at the magneto end of one of these wires will cut down the range of radio reception by fifty per cent or more.

The shielding on all wires associated with the magneto should make firm electrical contact with the magneto housing itself, and the terminals on the master switch and the booster magneto or coil should be enclosed in metal cans to prevent any possibility of interference leaking out. The latest models of all these units have been adapted by their respective manufacturers to provide complete shielding.

Adequate shielding of the battery wiring system is equally as important as that of the high tension system as outlined above. Experiments have shown that even when shielding of the ignition system is complete, no perceptible improvement is noted until the battery circuits have been completely checked over. The wiring should all be covered with a metal conduit or braid which is grounded at frequent intervals. Great care should be taken to have the terminals of the wires leading to the voltage regulator box entirely enclosed, and for the metal braid to make good contact with the box itself. The same precaution should be taken with the wires leading to the generator terminals. Occasionally, it is necessary to have a small spring on the end of the generator shaft as a ground connection, because bearings ride in a film of oil and the shaft would otherwise be insulated. This will usually eliminate any communator noise.

The installation of proper shielding in an airplane that is already in service is not a difficult job if the requirements are fully understood, and if care is taken in the process. Nevertheless, the logical place for this work to be done is in the factory while the plane is being assembled.

The responsibility of making all new ships ready for radio is squarely up to the manufacturers of airplanes and engines. The transport operators are the experimental

(Continued on page 222)

AIR— HOT AND OTHERWISE

Call a Halt on Shows

Young Is Just

Don't Get Stung!

Frank A. Tichenor

DURING the month just passed we have witnessed two more aircraft shows, that of American Legion Post Number 743, in Grand Central Palace, New York, and the International Aircraft Show, in St. Louis. From the point of view of paid admissions both were more or less successful, but so far as actual sales made are concerned, we doubt the effectiveness of either—indeed, we question the effectiveness of the whole show idea as a means for the promotion of the best interests of American aviation. We believe the time has come when the industry should realize the ineffectiveness of these exhibitions, expositions, shows, or what have you, in the principal thing that they are intended to accomplish—sales. Only actual promotion of the industry's goods really can help the industry.

We have had too many of these exhibitions, we have spent too much on them, they have done too little to push sales. I wonder, as a matter of fact, if they have done anything whatever in this direction. The same amount of time devoted by the manufacturers to consultations among their own staffs and with others in sensible coöperation as to ways and means of actually selling aircraft would produce better results. Figure up the expenditure of time and money on the two shows mentioned. Devote a tenth as much of both to the serious problems of the industry, to consultations, to planning sensible coöperation in sales efforts along non-show, really definite lines—do these things and then watch the baby grow. Show promotion, management and attendance have eaten up incredible amounts of the industry's time and money.

We should eliminate at once this continuous drain upon the pocketbook, the time, the energy of the American aircraft industry. Those who wish to spend money upon real promotion will get real results from individual sales efforts among known prospects, which include the great mass of Americans able to buy planes but needing to be educated to an appreciation of their usefulness. And there is the vast export market, now left by the American manufacturer to foreign exploitation. And there are engineering problems which confront us and which, unsolved, handicap us. Scientific educators find that kiddies can go too often to the movies for the good of their real education. American aviation must not become a mere fan show.

ONE group in the industry obviously would be glad to see Colonel Clarence Young out of the important job which he now holds and in which we hope his tenure will be as nearly permanent as is practically possible. They are the ones who yearn for special privileges, and the Colonel (being as he is, thank heaven) will give them no advantage over other companies and operators. That's one of many reasons why we are all for him.

Colonel Young, like his very admirable predecessor, "Bill" MacCracken, is three fifths of one per cent better than the celebrated soap, being 100 per cent worth while and on the job. He is intelligent and plays the game exactly as it should be played. The Colonel's chief, Thomas W. Lamont, also is a great official, just as for years the world has known him as a business leader. There is one within the inner fence, in the enclosure which should be free of all intruders of the sort, who is of the genus "pest." But Mr. Lamont is doubtless perfectly aware of that—and watching. A business man's training develops the ability and care for individuals of that special sort.

The best thing about Young is that he will not do for one that which he should not do for everyone entitled to the same privileges.

WHEN Napoleon was advised to kick a sinning soldier in that region wherein swift kicks are most effective, he replied: "Why glorify him?" Similar now to the great commander's attitude upon that occasion, is that of AERO DIGEST toward one Lloyd H. Atkinson, who signs himself "L. H. Atkinson, Mgr." (of the Globe Aero Service Bureau) to a plea that all and sundry shall send money to him to be used in the organization of an "aircraft labor union" and who finds AERO DIGEST's refusal of his advertising shockingly objectionable. A numerous and efficient rear guard is the thing for Mr. Atkinson.

It annoys us to be compelled to give him space, but at least 25,000 men are "eligible" for membership in the "labor union" which he is endeavoring to promote. We are very earnestly the friend of all air service workers. We want them to be prosperous, happy, progressive and everything desirable. We don't want them to be stung, buncoed, or flimflammed. Labor unions, speaking generally, have done wonders not only for the American worker, but for America itself. But those which have been thus effective have been under the right management and leadership, while (alas!) the general idea often has been seized upon by men of wrong intent. Our thought is not that Atkinson and his proposed union of America's aeronautical industry workers could possibly harm AERO DIGEST, as he with would-be clever malice intimates is his belief, but that they very probably, if permitted to grow and flower and fruit, might hurt the workers aimed at—each one to the extent of just ten good American dollars, the sum which he suggests each should send on as the initial price of membership in—what? We don't quite know. Any "eligible" air industry endeavorer might better spend the money on his girl, his family, spring underwear or even pinochle than to send it on to Mr. Atkinson; in the end more good would come from it thus spent.

Mr. Atkinson gravely charges us with having given an emphatic "No" when he asked to publish an advertisement in AERO DIGEST. Right. We did give that "No." We meant it. We hereby make it permanent and joyous, feeling that it proves our competence as publishers. But he errs in his classification of our actuating motive. It was not because he was thinking along lines of organized labor, but because he had recently passed through bankruptcy (the official papers in the case lie on our desk as we write this) with a list of unpaid creditors, both lengthy and expressive.

Atkinson's announcement, broadcast to those connected with the industry, starts off with the statement: "THIS IS AN UPHILL FIGHT, but We Have Plenty" and adds, in part: "On the grounds that any advertisement relative to the organization of an aircraft labor union is 'objectionable,' AERO DIGEST has refused to accept our copy. This clearly

(*Continued on page* 214)

TEACHING WOMEN TO FLY

By Fred L. Hattoom

of the Standard Flying Schools

TWO years ago when a girl enrolled for a flying course, all the instructors at the school went into a huddle and lots were drawn to see who would have the task of teaching her. She was probably the only lady student at the school and was the kind who, in her younger days, followed her brother along the top of the back fence and across the garage. In other words, she was the aggressive, dare-devil type whose sole purpose in learning to fly was for the novelty and thrill she got out of it. Stunts delighted her, and she invariably went in for them after her first solo.

Today the schools are enrolling and training the fair sex to such an extent that the lady student is no longer a novelty. Many schools have found it necessary to give up the single standard idea and to give special attention and consideration to the training of women fliers.

Standard Flying Schools at Los Angeles has one of the heaviest feminine enrollments in the country. During the past year lady aspirants for licenses have flocked to this southern school. With the soloing of a number of these students who showed flying ability far exceeding the expectations of their instructors and with the indication that their number would increase, practically a complete reorganization of teaching methods was put into effect. Also a complete line of women's flying togs was stocked by the accessories department, and special attention was given to the type of flying equipment selected in order that lady students would not have to be padded with cushions to enable them to reach the rudder pedals.

Elizabeth Kelly just back from a solo flight above the clouds

In the past it has been customary for the average school to use a standard make open biplane with dual controls that was not designed for instruction purposes. The majority of these planes used for training were practically out of the question for women students. The older deficiencies have been corrected in the modern training planes and the new designs are built for both male and female training. When sitting on a parachute, the student of short stature can easily reach all the controls and still be in a natural position.

Since the Department of Commerce rating came into effect, schools have been more careful in the acceptance of students because of the requirements of the percentage who must finish and graduate. Prior to this requirement, it was found that approximately fifty per cent of the girl students dropped out within the first six hours. Those who discontinued the course were faddists, whereas the remaining fifty per cent were intensely serious and completed their training.

Since July 1929, when the new flying school requirements went into effect, not a single girl student at the Standard Flying Schools has dropped out before finishing or has failed to complete the course. This has been the result of compulsory ground school training which quickly helps the girl students to gain a knowledge of airplane mechanics and consequently enables them to learn flying more quickly and thoroughly.

Although women do not make quite as good grades in aerodynamics and engine study as do men, they study harder and seem to retain what they learn. Girls take great interest in their flying and ground courses and look forward to their lessons with much interest and

Women students at the Standard Flying Schools: Left, Vera Dawn Walker climbing out of a training plane after an instruction flight; center, Mrs. H. H. Ogden, wife of the 'round-the-world flier; right, Hilda Jarmuth, Katherine Truett and Edith Bond enthusiasm. They are always prepared for their next lesson and are invariably properly equipped with helmet, goggles, and parachute before approaching their instructor. This is significant of their interest and forethought. The same cannot always be said of the male students.

Not every instructor can teach women to fly to the best of their ability. The instructor needs patience and must have the ability to impart his knowledge in a way that appeals to women students. This does not mean that he need have "IT." Even though women students are very anxious to learn, they are quite sensitive and cannot be corrected harshly.

The "hells" and "damns" of an instructor's vocabulary that carry emphasis in explanation to men students must be eliminated entirely in the training of the ladies.

The ordinary instructor is at a loss for words when handling students of the opposite sex. Hence the instructors of lady students are carefully selected, not because of their lack of expletives, but because of their control of them. Such language and emphatic reproach dampens their enthusiasm and retards their progress. For that reason, the instructor must make his corrections and explanations in a softer manner. This helps the girl flier to fly better each lesson rather than to be good one day and not so good the next.

The so-called "moneyed" young ladies are inclined, as are the men likewise "well-fixed," to slide through their course with the least effort possible, inasmuch as their object in learning is solely for the pleasure and exhilaration of flying. They skim the course for the essentials and do not delve deeply into the technicalities. Those who work for their money and take up flying, however, are more serious and more anxious to get all that the course offers; those who have the proper determination despite their financial circumstances usually make good, safe pilots.

Generally, girls require a little more dual time than do the men and are apparently not in such a hurry to solo. They require constant explanation and repetition of actual flight maneuvers and are a little slow to think quickly in a tight pinch. Although there is no decided difference between the learning ability of the blondes or brunettes, it has been found that the athletic type girl makes the better flier and learns much faster than the domestic type.

Marion Bowen, who is working for a transport license

Mr. and Mrs. H. W. Holliday, who are both learning to fly

Very few girls have mechanical knowledge of any kind, and most girl students *admit* that they do not know and are willing to work hard to learn. On the contrary, a man will not ordinarily evidence his ignorance; hence, instructing him about power plants becomes real effort. Despite this lack of mechanical knowledge, with a ground course in machinery and a good course in the theory of flight, a woman soon begins to gain a good understanding.

Out of over 1,500 students to complete training at Standard, one of the best was Mrs. H. H. Ogden, wife of the Army 'round-the-world flier. She had been in a plane only once prior to her enrollment. In six hours she was ready to solo, but because of the twelve-hour dual rule of the Standard school, she continued her training until solo.

Of the 1929 group of students, Elizabeth Kelly showed a remarkable sense of direction in the earlier stages of her training, and never at any time was she in doubt as to her whereabouts while in the upper realms. Vera Dawn Walker determined to equal the ability of good stunt pilots. The gyrations of her plane and the smoothness with which she handled the ship always received the plaudits of her instructors.

None of the women equalled the ground distance judgment of Edith Bond. She never failed to make a good, smooth three-point landing. For cool nerves, Marion Bowen led them all; from the early stages of her training she mastered each maneuver smoothly and seemingly with the accomplished ease of one already trained.

A number of times husbands and wives have signed up to take a course together. Recently such was the case of the Hollidays, ambitious Virginians. Mrs. Holliday is keeping up, step by step, with her husband's progress.

It is believed that during the coming year, schools that will consider the women students more seriously will experience a greater enrollment as well as a larger volume of ship sales. It is time to adopt the proved policy of the automobile dealer—*Cater to the women.*

FOG FLYING METHODS

By Lieut.-Commander P. V. H. Weems,

BLIND flying is 99 44/100% pure —*fog*. Darkness, rain, and snow, though troublesome at times, give very little trouble compared to fog. Therefore, blind flying, as the practical pilot understands it, is flying through fog, or through clouds which are nothing more than high fogs. Night flying, when the stars and beacon lights may be seen, offers no difficulty. Actual flying through fog, though difficult, is not the worst part of the pilot's experience with fog. It is getting safely to ground through a fog which licks the pilot. Some experienced pilots do not hesitate to take off in a dense fog, and to fly through it, if only they can be assured that the destination has a reasonable ceiling, or is clear of fog.

With average accuracy in dead reckoning, the skilled pilot can hop off in a fog, climb above it or fly through it, and reach a point 200 miles away with reasonable accuracy, say within fifteen to twenty miles. It is getting down through a fog without crashing into a mountain, splashing into water or wrecking the top of a tree, that so completely bluffs the average pilot. As more experience in fog flying is gained, especially in the air mail service, where these hardy pilots "make their appointed rounds" in all but the worst weather, it is definitely demonstrated that fog flying can be made with reasonable safety provided there is safe means of landing.

It is interesting to trace the development of the instruments now used for flying blind. As old timers like to relate, there was a time (about 1918) when the compass and the tachometer were used as blind flying instruments. The float chamber of the magnetic compass acted as a crude bank indicator, since it rested approximately horizontally. The compass was also used as a treacherous turn indicator, which brought many fliers to grief, especially when flying on northerly headings. The tachometer acted as a crude climb indicator, for it revved up excessively when the plane was diving, and when its revolutions dropped below a reasonable figure, it indicated an approaching stall.

In those days many crashes and many narrow escapes went unexplained. One vividly described experience of a British flier in 1915, gives most of the story:

"A huge bank of black clouds loomed ahead. Our orders were to land if clouds were too bad, but as two machines pushed on ahead of me, I pushed on, too. It started with a thin mist and then gradually got thicker. I continued so for about ten minutes and then found that according to my compass I had turned completely round and was heading out to sea. The clouds got thicker and the compass became useless, swinging round and round. I was about 7,000 feet up and absolutely lost. The next thing I realized was that my speed indicator had rushed up and the wind was fairly whistling through the wires. I pulled her up, but had quite lost control. I nose-dived, side-slipped, stalled, etc., time after time, my speed varying wildly. I did not get out of the clouds until I was only 1,500 feet up. I came out diving headlong for the earth. As soon as I saw the ground, I of course adjusted my sense of balance and flattened out. I was, however, hopelessly lost—the sea was nowhere in sight. I steered by my compass (which had recovered, being out of the clouds), and after a short time picked up the coast." (From "Air Navigation" by Wimperis.)

More recent experiences of the same nature are related by Donald Keyhoe in his interesting article which appeared in the *Saturday Evening Post* for November 9, 1929.

The point brought out by these narratives is the fact that the physical senses do not permit the average person to do blind flying without instruments. During recent years, we have definitely determined that our senses alone cannot be trusted in blind flying, and why and where the physical senses fail. Lieut. Ocker, who developed the Ocker System of Blind Flying, has perhaps done more than any other one person to demonstrate the cause, effects and means for overcoming the misleading physical sensations by means of suitable instruments. Ocker first convinces the student that his physical senses cannot be trusted. He does this in a practical way. The student is blindfolded, placed in a pilot's testing chair, and spun around. The subject tells what direction he is being turned. However, when the chair is stopped or slowed down, the subject thinks he is turning in the opposite direction. At this point he is permitted to see for himself that he is standing still, and that his sense of direction has misled him. Next he is spun around and at the same time permitted to see the blind flying instruments which show accurately what the chair is doing, but which seem contrary to his sense of balance and motion. Tests are continued till the subject is convinced that his senses are faulty, but that the instruments may be trusted.

Finally, it remains only to drill the student till he automatically follows the instruments and ignores the physical senses. When this state is reached, the subject can fly blind indefinitely, depending on his ability to concentrate sufficiently on the several instruments. The fewer instruments requiring observation, the longer one can direct the plane. This brings out the fact that it is highly desirable to have the instruments for blind flying combined in as few instruments as possible.

Although the instruments in use at present are not perfect by any means, it may be stated definitely that properly trained pilots can now do blind flying. Some experienced pilots on scheduled runs do not hesitate to take off in a fog and to fly through a fog, provided the extent of the fog field is definitely known, and provided the landing field at the destination is clear of fog.

There are diverse opinions as to the value of the gyro turn indicator combined with the gravity bank indicator. When properly understood, this instrument gives excellent results. On the other hand, the bank indicator being affected by centrifugal, as well as gravitational, force does not indicate directly the bank of the plane. In fact, the bank indicator might show the plane "level" when in fact it is in a steep bank, provided the plane is also turning at the same time.

A new climb and bank indicator made by Carl Schenk, who has had experience with gyros in the German Zeppelins and submarines, gives the information which is needed in a more direct manner than many climb and bank indicators. The Schenk instrument consists of a small wind-driven gyro with a vertical shaft which is seen through a semi-spherical glass cover. The glass cover is marked with lines similar to the latitude and longitude lines on a globe. The end of the shaft, relative to a point of the glass cover, shows

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CANADA'S AERIAL EXPANSION DURING 1929

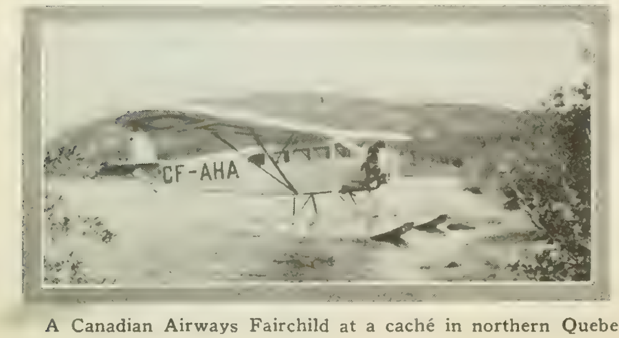
By James Montagnes

On an expedition into the hinterland: a Fairchild of Canadian Airways, Ltd., in flight over Northern Canada

DURING the past year, Canada developed an enthusiastic air-mindedness. Following closely on the opening of the northland by plane, commercial aviation in the Dominion in 1929 placed more passenger transportation routes available to the citizens living in the settled parts of the country. The air mail expanded till it is now practically transcontinental. The increase in pilots and aircraft registered in the Dominion is convincing evidence of how rapidly aviation instruction went ahead All in all, Canada's aviation statistics show the greatest year in her aviation history.

Ski-equipped Buhl of Cherry Red Airline on the ice of Churchill River

With the romantic still in the spotlight, perhaps no other commercial development stands out as much as that of the air mail which now leaves weekly, bi-weekly and bi-monthly for the fur posts along the Mackenzie River. A year ago an experimental flight was made by the Canadian government along this summer water route, which in winter is frozen over along its entire 1,500 miles. On December 10th, 1929, the first regular scheduled air mail left Fort McMurray at the end of steel, went winging along the Athabasca River, the Slave River, rounded Great Slave Lake, down the Mackenzie River to Aklavik on the Arctic Ocean, where the three Bellanca planes of Commercial Airways, Ltd., of Edmonton, landed the mail two days after Christmas, having flown a total of 12,000 miles and having faced blizzards and cold which brought the temperature as low as sixty degrees below zero. In all, the company ferried four tons of mail to the various outposts on that first trip. The planes were able to fly only two and a half hours a day because of the long Arctic nights, and made the actual trip from Fort McMurray to Aklavik in three days. Formerly, Aklavik was lucky if it had one mail a winter, and that letter-mail only.



A Canadian Airways Fairchild at a caché in northern Quebec

During the winter the Arctic mail leaves weekly for Chipewayan, Fitzgerald, Fort Smith and Fort Resolution. Every two weeks the mail goes on from Resolution to Hay River, Providence and Fort Simpson, and every two months, the rest of the way down the mighty Mackenzie River to Fort Wrigley, Fort Norman, Good Hope, Arctic Red River, Fort McPherson and Aklavik, where Eskimos have electric light and power schooners, and where a plane last summer conducted a profitable taxi service.

Air mail has developed in Canada to such an extent that the volume has increased from 316,631 pounds in 1928 to 435,163 in 1929. Today there are in operation routes from St. John in New Brunswick to Montreal, Toronto and Detroit; from Winnipeg to Edmonton, Regina and Calgary; from Fort McMurray to Aklavik; from Sioux Lookout to Red Lake in Northern Ontario, and to many other points in the northland which were not on the map five years ago. In fact, the bulk of the Canadian air mail is destined for the northland.

There has been considerable expansion in the air mail between Canada and the United States Colonial Airways have added the Buffalo-Toronto route to the already established Montreal-Albany route. Mail carried on the Montreal-Albany line amounted to 20,963 pounds, whereas that carried on the Toronto-Buffalo service, started during the summer, was 10,134 pounds during the last three months of the year.

Canadian Airways, Ltd., of Montreal, was awarded the Montreal-Detroit air mail contract, this company previously having been operating the Montreal-Toronto air mail. Mail leaves Montreal at 9:15 a.m. and arrives in Detroit at 4 p.m. to connect with the outgoing air mail from Detroit; in the other direction, the mail leaves Detroit at 6:20 a.m. and arrives in Toronto at 8:10 a.m. and Montreal 11:30 a.m. The route is 588 miles.

Other international lines already operating or ready for early inauguration include the Victoria-Vancouver-Seattle service and the Winnipeg-Fargo airline.

Air mail contracts in Canada are held by but a few companies. The entire service from St. John to Detroit is operated by Canadian Airways, Ltd., said to be the second largest operator on the continent. This also includes a number of services to outlying posts, such as Seven Islands and Anticosti Island in the St. Lawrence River, With the exception of the contract let in December to the Compagnie Aerienne Franco Canadienne for a 130-mile service between Oskelaneo and Chibougamou and the London-Pelee Island service held by London Air

At Fort Smith; three Bellancas used for the Arctic air mail service inaugurated in December

Transport, all other contracts within Eastern Canada are held by Canadian Airways.

The condition in the Canadian west is about the same. Until the time the contract for the Mackenzie River service was awarded, Western Canada Airways of Winnipeg operated all the air mail west of the Great Lakes. This company has at present all contracts for the northland, as well as for the new Winnipeg-Regina-Edmonton and Winnipeg-Calgary routes. Commercial Airways, Ltd., of Edmonton, hold the Mackenzie River contract.

Passenger, express and taxi services have also prospered during the year. Especially on the air mail routes has the number of passengers carried grown. There are now ninety-six commercial operators in the Dominion, compared to fifty-three in 1928.

D.H. Moth on floats, used in the forest fire-fighting service of the Canadian government

Canadian-Colonial Airways, Ltd., flew 56,905 miles and carried 244 passengers on its mail run from Montreal to Albany. These figures do not include the Albany-Montreal run. For the year the operating efficiency of this firm was ninety-one per cent.

Gillies Air Service, Ltd., operating at Kitchener, Ontario, ran up a mileage of 49,056 and carried 948 passengers. Another air taxi and flying school service operating at Belleville, Ontario, is Leavens Brothers Air Service. This concern carried 5,228 passengers for 82,080 miles, having made 2,768 flights. The company operates a Waco Nine, Curtiss Canuck and an Eaglerock.

In the west, Great Western Airways, Ltd., carried 2,607 passengers, an increase of 1,000 over its 1928 record. This company tackled a most dangerous bit of work when, early in the year, Captain F. R. McCall flew the company's Stinson-Detroiter to Shelby, Montana. At Shelby was waiting a cargo of 100 quarts of nitro-glycerine, and an expert shooter. The cans of the dangerous explosive were bundled into the cabin of the ship, which after battling heavy winter headwinds across the prairies, landed two and a half hours later at Calgary, where the nitro-glycerine was trucked to the Turner Valley Oil Fields. The plane left immediately for a second load.

The first company in Canada to use the airplane in an advertising campaign was the Walter M. Lowney Company of Montreal, manufacturer of chocolate confections. Following its first year's successful use of the airplane in a sales campaign, this company bought a Travel Air ship equipped with a J-6 Wright Whirlwind engine. The first machine had put in 250 hours of flying in the vicinity of Montreal

Notable achievements during the year included some hazardous flying in the Barren Lands. Dominion Explorers, Ltd., a mining exploration outfit, flew 161,060 miles during the year between the bases of the company along the Hudson Bay. Towards the end of the season, two planes of the company set out from Chesterfield Inlet to fly to the Coppermine River on Coronation Gulf. Winter had already set in, and the two ships were forced down half way. For six weeks nothing was heard of the party, while twenty planes combed the territory, braving blizzards and cold and bad ice. Then a radio message came out one day from a Hudson Bay Company schooner anchored at Cambridge Bay, Victoria Island. It told of the arrival of the party at the small outpost, one of the most isolated on the continent. The ships had come down on Bathurst Inlet, and after weeks of waiting for the ice to harden, the aviators (among whom was the president of the company, C. D. H. MacAlpine) were conducted by a party of wandering Eskimos to the post at Cambridge Bay.

On the eastern shore of the Hudson Bay an equally hazardous flight was made by Canadian Airways, Ltd., when it sent in four planes with a prospecting company to survey the hinterland of Quebec as far north as Ungava Bay on the Hudson Straits. It was necessary to freight in food supplies, mining equipment, canoes, and gasoline and oil. Flying conditions were not of the best, the country being relatively unexplored and poorly mapped. The company's chief pilot, D. S. Bondurant, was given the job. Most of the way he had to map in the main landmarks in order to find his way back and forth over this land of mountain and lake.

Bondurant not only flew to Ungava Bay, following the main waterways, and thus penetrating the vastness of the country for the first time by plane, but in addition he photographed Hamilton Falls with a small cheap camera through the heavy mists which are visible for ten miles. Those photographs were the first aerial pictures ever made of the waterfall, which is said to be a greater potential source of power than Niagara, and which has a total drop of 800 feet, the largest single drop being 302 feet. The thunder of the water is said to be audible for twenty miles, above the roar of a Wasp engine. The photographs are being used by the Canadian government.

Western Canada Airways, one of the largest operators on the continent, flew 625,000 miles during the first nine months of the year.

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Changing the landing wheels of a Pitcairn for skis

"SAY IT WITH FIRES"

By

Cy Caldwell

It is indeed a pleasure to me to be able to announce that my long and mostly mis-spent life at last has been crowned with a signal honor. This is not the first time I have been crowned with something or other, but it's the first time I've been crowned with honor. Which simply goes to prove what I have always maintained: that if you only do one thing, but do it rather better than anyone else, the world will take notice of you and honor you or put you in jail, according to whatever it was that you did to attract attention.

And the funny thing about this honor is that my poor old father predicted it years ago, when someone asked him if there really was a single point in my favor. And my dad, after pondering for some time, and pretty near giving it up, said, "Well, he's a good smoker." That's the only praise I've ever received from the Governor, so I treasure it.

And now, my friends, I'm proud to announce that my father's confidence in me was justified. At their annual convention a group of deep thinkers, The Casual Order of Visiting Firemen, have unanimously decided that I have burned up more pipe tobacco than any man living, or any man even half living—such as married men. So as a mark of their esteem they have elected me an Honorary Fireman representing the Aviation Industry, and have invited me to attend the Fearless Fire Fighters' Flaming Frolic, to be held amid the ruins of the next hangar that burns up.

Now, folks, I've got the invitation, and all you people in the aviation business have to do is to supply the ruins. You've been very good about this in the past, and now that I'm an Honorary Fireman, needing the ruins of a hangar to hold a frolic in, I don't want you to fail me.

In fact, I don't mind telling you, in the strictest confidence, that I have been retained by the Visiting Firemen to manage a publicity campaign addressed to the aviation industry, stressing the need for bigger, better, and more expensive fires. Not that the fires you've given them so far haven't been appreciated—you've been most kind—but they want more of them, many more.

But before I describe the campaign itself, it might be well for me to sketch briefly the sad aspects of a fireman's life, and thus bring to your sympathetic notice the tough things the fire laddies are up against. You perhaps, seeing firemen sitting day after day, week after week, in front of the engine house on cane-bottomed chairs, may have imagined that they lead a life of ease—like an Admiral in the Navy.

Such is not such. On the contrary, a fireman's life is one of hardship. How many times has a fireman gone home at night with the seat of his pants utterly exhausted! He has labored all day long, sitting there on a cane-bottomed chair, gradually collecting a crisscross pattern on his anatomy, and enduring it patiently. Some thoughtless fellow, such as a rubber in a Turkish bath, casually admiring the design, little realizes the super-human patience required to sit motionless for hours, letting the pattern sink in, taking care that the edges are sharp and distinct, and not blurred by movement. How truly has it been said: "One half the world doesn't know how the other half loafs." or it would loaf too. (A few of us thought we had discovered the secret until last October, when the delightful bulls were stampeded by a disgusting animal called a bear—so we're all back to work, firemen, writers, pilots, and all. But let's forget that disaster.)

The unfortunate fireman, doomed to a life of pattern-collecting, can only sit around hoping for a fire. A fireman can't start a fire, you know. Or he isn't supposed to. Just why it is, I don't know, but it isn't considered quite the thing for a fireman to go out and make his own fire. I suppose it's just part of the ethics of the profession, like in the medical fraternity, where it isn't considered quite ethical for a doctor to break a man's arm so he will have something to set. Of course, if a man runs to a doctor and says, "I have a pain in the stomach," it is then perfectly professional for the doctor to say, "I'll take out your appendix," and simply take it. But that's another matter, and easily explained. You see, the arm is on the outside of the body, and the man knows he needs it; but the appendix is inside and nobody really knows whether he needs it or not, so he's careless about it. It is amazing the number of people who have gone to a doctor with a pain in the stomach and come out of his office with their appendix in a bottle. One doctor I know specialized in appendix operations for no other reason than that he had bought ten gross of appendix containers at a discount, and felt he had to use them.

But I only mention the surgeons to show how all professional men, like doctors and lawyers and firemen, have their ethics. And one of the principal ethics of the fire-fighting profession is that the fireman shall not set his own fire. He may be slow getting to it, mind you, and let it get a better start; he may lose his way, and go charging up and down the wrong streets, ringing a bell; or he may forget to bring his hose, and have to send back for it. He may do all that and remain in good standing. But just let him start the fire himself, and he's frowned upon. He may even be asked to resign from the department.

Now, at this last Fearless Fire Fighters' Flaming Frolic, held beside the charred remains of a large airplane that some mechanic had been doing a welding job on, the question came up: "How can we get more fires, and yet not violate the ethics of the profession?"

And I, being keen to extinguish myself as a new member jumped up and said, "Why not run a publicity campaign educating the aviation industry to the need for fires? Why simply sit around waiting for fires when you can plan a campaign, full of push and gas, and have any number of fires given you for nothing?"

Well, one word led to another, and the upshot of it was that I was delegated to educate the industry to the need of constructive effort along that line. So I set to work and made a little survey of fires in the aviation industry, from ordinary hangar fires up to the more interesting fires that follow crashes. And I want to say right here that the firemen are not complaining. You aviation boys have treated them very well; very well indeed. You've done better than almost any other industry. You've been mighty good to them and they're grateful, especially for that last four-motored monoplane and the three houses it burned up. They certainly appreciated that one, boys, for it showed your hearts were in the right place.

And speaking on behalf of the Visiting Firemen generally, I want to say that they approve of your keeping on taking up multi-motored planes with only half the motors running. It gets them out for a stroll

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RECONDITIONING ARMY AIRCRAFT AT DUNCAN FIELD

By M. C. Cooper

FIFTY-FOUR per cent of all reconditioning of aircraft for the Army Air Corps is done at Duncan Field, Intermediate Air Depot five miles southwest of San Antonio, Texas. The three other Government depots in the United States are located at Middleton (Pennsylvania), Dayton (Ohio) and San Diego (California), and combined, take care of the remaining forty-six per cent of the work on Army planes.

The Duncan Field reservation, where the Government has devoted $17,000,000 to the development of 403 acres, consists of the depot supply area, engineering section, operations office, quarters for fourteen officers and their families, and quarters for about fifty civilians and their families who live on the field.

The depot supply area houses materiel valued at $57,000,000, including new and rebuilt engines, disassembled ships, airplane parts and accessories. Aside from the great mass of raw materials such as wood, metals, and fabrics used in building and reconditioning airplanes, the supply area keeps on hand from thirty to sixty planes ready to be flown, as well as a large number of parachutes. The supplies are stored in one large central warehouse, six large hangars, two small hangars, and one open storage park for materials. Sixty employees are retained to handle this stock, which is one of the largest collections of aviation materiel on the face of the earth.

The remaining $20,000,000, which brings the total Governmental investment to $77,000,000, has been applied to the engineering section, quarters, operations office, sewage depository and water works.

The engineering department is the workshop of the field. Housed in nine large hangars that have been converted into shops for the repair of airplanes, this section employs 522 persons. The total civilian monthly payroll is approximately $75,000. Seventy-two trades are represented by the workmen in this department, including all the mechanical arts, expert cabinet makers, fabric cutters and fitters, painters and "dopers."

This shop reconditions all Army planes within the Eight Corps Area which includes Kelly and Brooks Fields. Some idea of the enormous amount of work that this depot is called on to perform may be gained from the fact that practically a third of the military air service in the entire United States is located in the Eighth Corps Area. The depot also furnishes March Field with about six planes a month, and three or four planes are sent monthly from Duncan Field to various other fields throughout the United States. During 1928, the engineering department at the field overhauled 535 airplane engines and reconditioned or rebuilt 268 airplanes.

Not all planes are damaged when they are presented for reconditioning. To increase the degree of safety, an accurate record of flying time on each ship is maintained, and complete overhauling takes place when the estimated number of safe flying hours has been reached. Primary training planes are allowed approximately 425 flying hours; pursuit planes, 700 hours; and bombardment planes, 800 hours. This time refers to the plane, not the engine. Motors come in for overhauling when they have had from 200 to 400 hours in the air.

Planes too badly damaged to be flown are shipped by rail to the depot supply officer, who delivers them to the engineering department. The engineering officer, shop superintendent and airplane inspectors make a very careful inspection of the plane to estimate the percentage of damage. It is not considered impractical to spend as high as half the original cost reconditioning a new plane. Should damage on an old model plane be estimated to exceed thirty per cent of its value, a further inspection is made to account for the good parts, which are removed for use in repairing planes of the same type.

A plane arriving to be reconditioned is taken to the dismantling hangar where all parts are taken off and sent

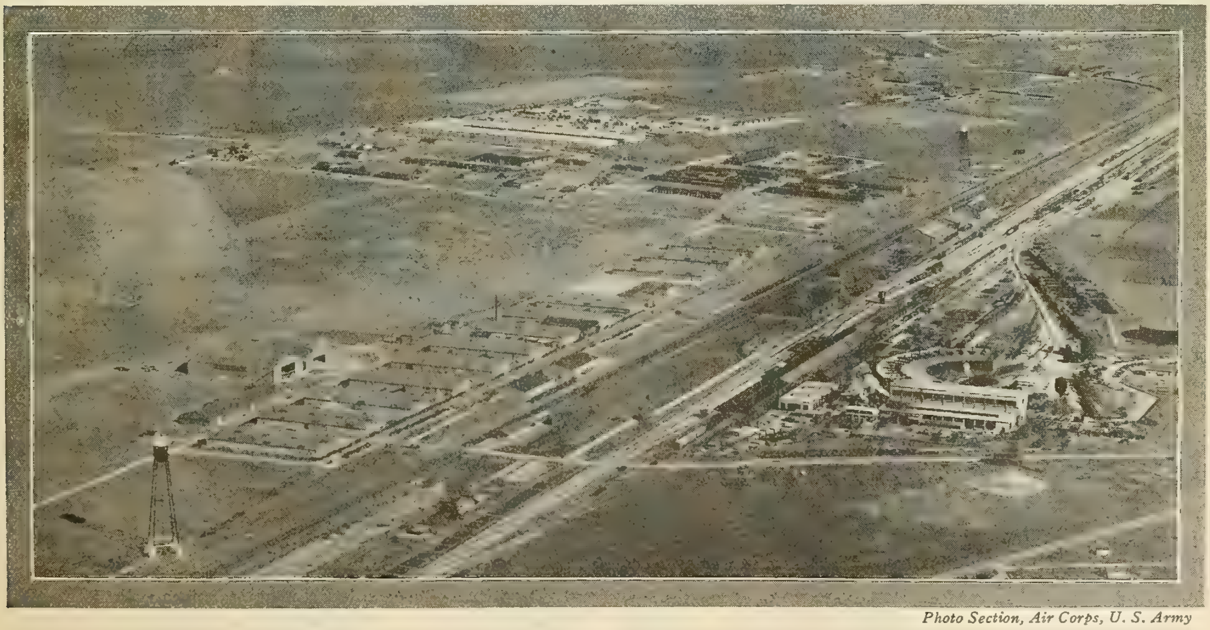
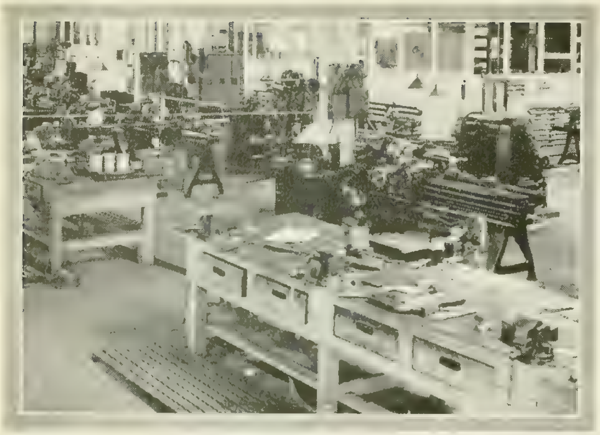


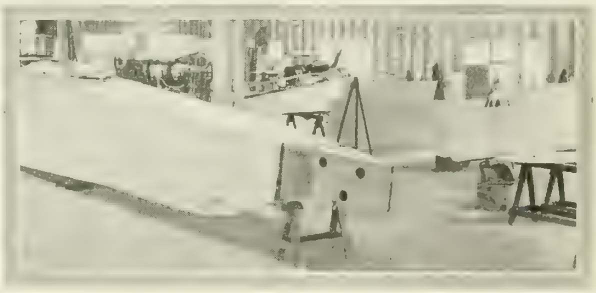
Photo Section, Air Corps, U. S. Army

Aerial view of the Duncan Field Intermediate Air Depot showing the repair shops and storage and testing buildings



The sub-assembly department in the engine repair shops.

to their respective departments. The engine and all mechanical parts are loaded on a small truck and delivered to the motor overhaul at one end of the line of hangars. The general assembly is in the center of the row of nine hangars. This arrangement allows the fuselage, wing and tail surfaces to be worked on and sent from the dismantling hangar to the center, while the engine parts are being reconditioned and proceeding toward the assembly hangar from the other end.



Fuselages and wings receiving a new fabric covering.

In the reconditioning of an airplane—after the motor has been removed—the fabric is removed from the wings and tail surfaces and all paint on the woodwork is displaced. The skeleton wing and tail structures are then sent to the wing repair section, where a careful inspection takes place. Cracked or rotting spars are sufficient for the wing to be condemned and destroyed. Broken ribs are repaired by cabinet makers and presented for inspection upon completion.

The fuselage (all Army fuselage structures are now of metal construction) is taken to the machine shop where broken tubing or members are replaced and welded. After reconstruction and inspection, the fuselage is given a coat of aluminum paint. Standing repaired and painted, awaiting the fabric covering, the fuselage in this state appears completely new.

In their progression down the line, the empennage, wing surfaces and fuselage converge in the fabric department where they receive new covering. Long staple cotton, displacing the linen fabric so long in use, is cut, stretched over the parts, and sewed by hand. The one-place and two-place planes require about 150 yards of material, whereas the bombers use over 500 yards each. Twelve women employed during the last year in the fabric department have proved satisfactory. No women are employed in any other section of the entire engineering section.

From the fabric department these parts are taken to the "dope house," a large hangar which looks like a copper bowl. The color of the floor, walls and ceiling is a result of the paint which is in powder form before being mixed for application. The aroma of the dope room arises from the colorless mixture applied in several separate coats as a base for the paint. Following the coat of paint, in standard Army colors, insignias and lines of trimming are applied by skilled workers and the surfaces arranged in racks where they remain until rigged to the plane in the final assembly.

The propellers are cleaned, tested and balanced. The landing gear is renovated, painted and assembled. Wires and cables are carefully inspected and repaired. In the upholstery room the worn cockpit fittings are replaced with new leather and cushions. Every part is as good as new and looks new as it stands in readiness for the final assembly.

The engine, upon leaving the dismantling room on a truck, is sent to the cleaning department where it is completely disassembled. There is a special compartment for every part of each motor—from the crankcase to the smallest screw or nut. Every part is cleaned in gasoline, and some parts are given a second cleaning in soap and water. Large wire trays filled with parts are drawn through large vats of gasoline and then, if necessary, through the boiling suds. In the disassembly room, the engine undergoes its first inspection. Parts that are worn or faulty are tagged and go through numerous other inspections by experts who, with their many precision instruments, inspect the parts, condemning those not up to standard. If the part is not perfect, it is replaced.

Progressing to different bays where mechanics specializing in each of the six different operations of repair work on it, the engine reaches the final bay where it is timed. It requires 120 man hours—or, one might say, it takes twelve men ten hours—to overhaul completely and reservice a Liberty motor. A Wright engine goes through the overhaul in sixty-eight man hours.

All parts of the plane are brought together in the final assembly. A complete fuselage is released from the final fuselage assembly. The small P.T. and the bomber alike progress into the final assembly hangar where the engines are installed. The fuselage and its newly installed motor are put on the test block. For the same reason that the new automobiles are driven slowly, the airplane engine is run at half throttle for several hours, during which time adjustments

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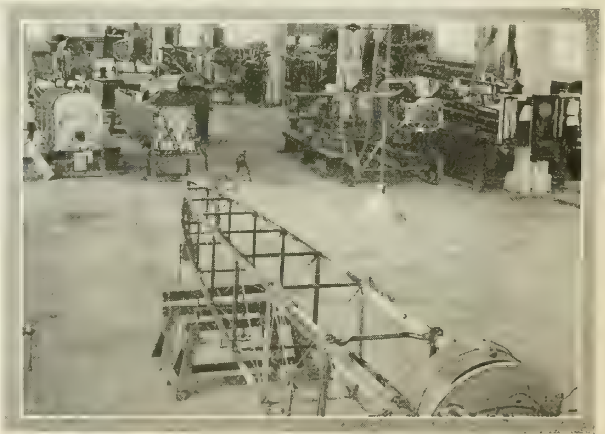


The fuselage repair department at Duncan Field

INTERNATIONAL FLYING PROBLEMS

By Hon. Clarence M. Young

Assistant Secretary of Commerce For Aeronautics

THE subject "Problems of International Flying" presupposes international flying. It would seem in order, therefore, to refer briefly to the existing status of such flying, and perhaps gain an indication of what may be anticipated in the way of its further extension. Apparently it is the latter—the transoceanic services—which will involve the major problems.

For the past ten years air transport organizations have conducted international services in Europe. They have been developed to the point where nearly every major country has been linked into the aerial highway system, including India and Africa. They have become so much a part of the general transportation scheme of Europe as to be almost indispensable. Therefore, it may be said that international flying in Europe has long since become an established fact and an economic necessity.

Within the past three years international flying on the American continent has likewise become a matter of major importance. American air transport organizations are now operating scheduled services into Canada, Mexico, Central and South America, to Cuba, the West Indies and the Bahamas, transporting passengers, mail, and merchandise. These operations are being constantly extended, and, as in Europe, are proving to be so necessary in the general scheme of things that they too are rapidly becoming a prime necessity in our further business intercourse and better international relationships.

In establishing and conducting these services there have, of course, been unusual circumstances to meet and difficulties to overcome. Thus far, however, they have not been insurmountable, and remarkable progress has been made. Europe has had certain advantages because of the proximity of various countries, and because of the absolute necessities in the premises; also, because most of the major countries became adherents to an international convention soon after the war, and thus eliminated some of the political and diplomatic difficulties which might otherwise have arisen. The fact remains, however, that American organizations now operate over some 11,500 miles of airways in contiguous countries, maintaining approximately 58,000 miles of scheduled services each week and that extensions thereof are being made as rapidly as circumstances permit, or the desirability becomes apparent.

Assuming then, that suitable progress continues in the further establishment and operation of international services on either side of the Atlantic and Pacific Oceans, there remains the necessity for linking them together—by transoceanic airlines in order that world-wide air transportation may be complete.

The obvious question is—will it be accomplished, will transoceanic services be realized? If so, when? The future alone holds a definite answer. Personally, I feel sure that it will, and that we shall eventually see such services, reliable in character and certain in operation—perhaps within a decade. In any case, it is here that the more serious problems arise.

Three groups seem to suggest themselves as of major importance.

First: The type of equipment to be employed, including not only aircraft, but ground facilities such as radio and communication services, weather reporting systems, intermediate landing points, navigation equipment and aids, flying and ground personnel.

Second: International agreements, including customs, entry and clearance, airworthiness phases, the definite separation of military and civil operation, etc.; all of which make necessary a general recognition of international controllability in a manner comparable to shipping, but partaking of certain elements not akin to shipping.

Third: The economics involved—the operating expense, the essential offset in the matter of transportation rates, and the resultant business potentialities.

There are doubtless many other difficulties which will become manifest; but if the three just named (and not necessarily in the order of their importance) are suitably disposed of, then the service is assured.

Aircraft and Equipment

OBVIOUSLY any type of aircraft which is employed must provide a payload capacity consistent with the operating cost. In any transoceanic service, such a plane must also be capable of sustained flight of unusual duration. And this is true even though certain intermediate landing facilities may be provided. With the present type equipment, therefore, it seems apparent that, for the relatively near future at least, such service will probably be limited to dirigibles rather than airplanes except, of course, in short water crossings such as are involved between North and Central America where the airplane has already proved its practicability. To be sure, airplanes have successfully accomplished non-stop ocean trips, but at least they were an extraordinary operation, and the load in each case was limited to the fuel, crew, and equipment; whereas dirigibles have already transported substantial payloads, and such loads will be materially increased in the larger types now being built. Even now a survey is being made by an American organization interested in the establishment of transoceanic services with dirigibles, and there is reason to believe that it may be undertaken in due course, at least in an experimental way.

Doubtless airplanes will also be developed to the point of practical usefulness in such a service. Intermediate landing and servicing facilities will probably be required, but even these are being experimented with in the form of "floating islands" equipped with radio, hangars, machine shops, and other necessary devices. As a matter of fact, a scale model has been satisfactorily tested, and a full sized unit is now under construction for practical demonstration purposes.

It seems reasonably certain that aircraft suitable for transoceanic and other sustained flight service are within reach and will be made available.

Of equal importance, however, are the necessary ground facilities, such as radio communication for weather service and navigation purposes. These do not present serious technical difficulties. Radio communication between aircraft and the ground is an established fact and is being accomplished daily in a practical way. Radio range beacons which lead a pilot to a definite objective are in the same category. Navigation, though perhaps requiring modified calculations because of speed and other phases not usually encountered, is nevertheless governed by the same fundamentals as in any other case. And an adequate weather reporting system can be organized with the knowledge and facilities now available.

Given the aircraft to negotiate the required distances suitably, the remaining

(*Continued on page 240*)

An unusual view of a Wasp-powered Ford trimotor of the New York, Rio and Buenos Aires Line crossing the Andes between Santiago and Buenos Aires

CHILE'S AVIATION PROGRESS

By John K. Montgomery

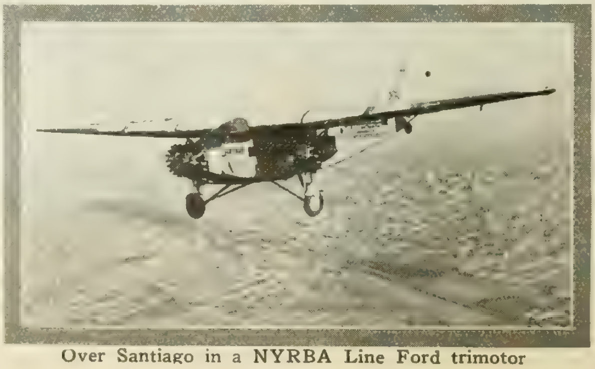
President, American International Airways, Inc.
Vice President, New York, Rio and Buenos Aires Line

IT was the nineteenth of September of the past year. I had just witnessed the flower of the Chilean army pass in review before the President of the Republic and a throng of 50,000 spectators. The review was over, and the crowd was pouring back into the city from the park where the parade had been held.

All day a low fog had been hanging just above the tree tops, making impossible flying conditions. As we were walking back into the city, the heavy curtain of gray mist began to lift until a ceiling of perhaps 500 feet, with a visibility of a mile, was possible. From the south came a faint humming that rapidly increased in volume to a deafening roar, and suddenly out of the mist appeared five great Junkers trimotored bombing planes in formation. Immediately the air was full of squadron after squadron of planes, each formation following closely upon the leaders.

Vickers-Vixen observation planes, Wibault single-seat fighters, Moth training planes, and then the pride of the Chilean air corps, the fighting squadrons of Curtiss Hawks and Falcons. Down they went to the west, a great circle, and then over the heads of the troops marching up the Alameida, swept the whole formation until sixty-two planes had roared by, to disappear again into the mist.

Remembering a few years since when, at the maneuvers of our Army Air Corps, we had had thirty-six planes in the air, I could easily appreciate the pride with which Chile viewed this grand display of its fighting air force. Such a remarkable sight is, however, not infrequent in Chile, nor even extraordinary, after one has had a chance to study the remarkable air development which has taken place in this little-known neighbor of ours.



Over Santiago in a NYRBA Line Ford trimotor

Before embarking the thirtieth of last June for our goodwill flight to South America, I had endeavored to obtain information on Chilean aviation. Comandante Ramon Vergara, assistant chief of the Chilean air corps, had been in the United States for several months prior to my departure and had told me much of what was being done in aviation in his country. But I was inclined to doubt some of the information because it seemed impossible. After having spent the better part of the past five months in Chile, I can find no superlative sufficiently strong to describe the progress which has been made there in aviation.

A country 3,000 miles long, fifty miles wide and broken by topographical conditions that make aviation a necessity. That is Chile!

The present administration has been quick to realize the possibilities of the airplane and has taken full advantage of its use. In all South America, here is the only mail and transport line that is purely national and the entire personnel of which is composed of citizens of its own country. The Chilean National Line is now operating between Santiago and Arica in the north, and from Santiago to Puerto Montt in the south, a distance of 1,700 miles, on a three-times weekly schedule. All internal aviation is directly under the government, and the Chilean National Line is operated by army pilots and mechanics.

Along the present line are a chain of modern airports completely equipped with every facility, including radio. They are located at Santiago, Ovalle, Copiapo, Antofogasta, Iquique, Arica, Chillan, Temuco and Puerto Montt.

Mount Anconcagua, 23,100 feet high, the second highest peak in the world, as it appears from an airplane

Eight Fairchild cabin monoplanes are used at present, and in October two trimotored Fords of the latest type were ordered to give even better transportation facilities on this route. Thanks to the splendid missionary work and the good-will built up by our own Jimmie Doolittle and the Curtiss Aeroplane Export Corporation, American aviation interests have secured a fine foothold in Chile and all new planes bought within the past two years have been of American manufacture.

Chile is fortunate in possessing as director of civil aviation and chief of the army air corps such an able administrator as Colonel Arturo Merino. He has had vision to see the possibilities of the airplane and the ability to organize and take full advantage of them. In this work he has enjoyed the whole-hearted support of his immediate superior, General Bartolme Blanche, minister of war, and of his Excellency, General Carlos Ibanez, President of the Republic. General Blanche is one of the most enthusiastic exponents of aviation and makes all inspection trips, wherever possible, by airplane. Another point which appeals immediately to fliers is that Colonel Merino and his assistant chiefs, Comandantes Vergara and Aracena, are pilots themselves and are able to appreciate flying problems from the pilot's point of view.

The show of September 19th was a typical example of the excellent organization of the Chilean air corps. Squadrons of planes were mobilized from points 800 miles distant, brought to Santiago for ten days, went through practice flights, taking off and landing in squadron formations, put on the great parade on that day under most difficult weather conditions, and then returned to their bases. From start to finish there was no accident of any sort. This performance was tribute enough to the organization and personnel behind the show.

At the present time Chile is served by three international airlines: the Pan American-Grace Airways, running down the west coast from the Canal Zone, carry United States mail down the west coast and across the mountains to Buenos Aires; the Compagnie Aeropostale, the French line, operates from Santiago to Buenos Aires, up the east coast to Natal, Brazil, thence by ship to Dakar, Senegal, and by plane again from there to Paris. The NYRBA Line, of the New York, Rio & Buenos Aires Line, Inc., pioneered the first and is operating the only mail and passenger route between Santiago and Buenos Aires. The NYRBA route extends from Buenos Aires to Montevideo and up the east coast through Brazil. These three lines, with the Chilean National Line, are operating 12,600 miles a week on regular schedule in Chile and give a ten-day service to New York and eight and one-half days to Paris. In the middle of February the NYRBA Line opened its route and now gives a nine-day service from Santiago via the east coast to the United States.

Chile furnishes a most fertile field for American manufacturers of aviation products, and companies entering this field on a basis of fair play to all concerned can rest assured of the utmost courtesy and coöperation on the part of the Chilean government. An example of the friendly attitude of the government towards aviation is the fact that all aeronautical material such as planes, engines and spare parts are admitted duty free.

The government is encouraging private flying in a unique manner. It furnished the Aero Club of Chile with training planes and experienced military instructors free of charge. Anyone may join the Aero Club and then, if physically qualified, may take the flying course. The membership fee is $100 annually for Chilean citizens and $200 for foreign citizens, and that amount covers the flying instruction also. The club has an enthusiastic membership, and among the students under instruction were quite a few of the feminine sex. The Chilean girls in general are ardent aviation fans, and judging from the way they have taken to flying, I believe that this country will soon have more aviatrices than any other South American country, as it now has aviators.

As seen from the air, Chile is the most beautiful country that can be found anywhere, and a trip over the Andes from Santiago to Mendoza provides a vista never to be forgotten. The plane passes near Mount Anconcagua, 23,100 feet above sea level and the second highest peak in the world. Perhaps the best description of these mountains was given by a mechanic of the (*Continued on page* 214)

Left, Col. Arturo Merino, director of Chilean civil aviation and chief of air corps; center, a vee of vees formation of military training planes flying in a Chilean air corps review; right, General Carlos Ibanez, President of the Republic of Chile

INDIVIDUAL SALESMANSHIP

By John A. Rossiter

THE present plight of the airplane manufacturer in seeking a market for his product appears the result of a comedy of errors. First of all he has grossly oversold himself on the ability of the public to realize the many advantages of the airplane. I speak—I hope not boastfully—as one who blundered into selling and liked it well enough to take the knocks necessary to acquire at least a working knowledge of its principles.

I have, in patience and with good grace, listened to the cut and dried formulae propounded by sales managers. Oddly enough I have known but few of these master salesmen who were good at nosing out prospects or in closing sales. I have witnessed magnificent and expensive selling gestures "flop" dismally, due to disregard of the simplest elements of salesmanship.

I often wonder how many producers fully realize the part in their success played by the individual competent salesman. Without him many wheels would cease turning. I have known of cases in which a few persistent salesmen have put over an issue after tons of printed matter had been circulated and its existence forgotten. Do not infer that I mean legitimate newspaper or magazine advertising. No one could induce me to waste my time attempting to sell an article not advertised intelligently and liberally.

But let us consider the methods of an airplane salesman, typical of some that I have known; but to be specific, let us refer to him as an individual known as A——. Let us further assume that A—— is about thirty years of age and without doubt well above the average in intelligence, and that he lands on what the town of M—— is pleased to call its airport. M—— has a population of nearly 12,000 inhabitants. It is an average town located in ideal flying country. The per capita wealth of the county in which it is situated is above that of the State in general. Its residents own automobiles valued at possibly a quarter million dollars, but not a single airplane.

A—— spends three days in the town of M—— and creates quite a stir. He does not sell an airplane although he "hops" possibly fifty of the residents, many of whom go up for the first time. A—— will tell you in all seriousness that getting them "up" served to make them "air-minded", whatever that may mean. Personally, if this is true, I should be "roller coaster-minded," for at the age of forty I confess to a weakness for that breath-taking device. I am not going to purchase one, however, for the reason of the simple thrill given me, even if they some day sell within my limited means.

The problem of A—— is interesting. He is offering for sale and at a fair price, a reasonably safe and highly perfected device—possibly the greatest invention of all time. Newspaper space free—the envy of less favored lines—together with Governmental and substantial private aid, has served him. The device which he offers for safe and extremely rapid carriage of man and goods is comparatively new, it is true; but it is human nature of an old line that holds the purse strings in the town of M——. Fear does not keep some fifty of its men, women and children on the ground. They are actually eager to pay for the privilege of taking a short flight with a stranger. Others in this town have been up before, and their knees do not shake when they step on terra firma following a ride.

Each year the business man of M—— buys a car or truck, speedier than his last. Little need to explain that an hour saved in travel is a productive hour added to the all-too-few hours of life, for he is accustomed to buying demonstrated units of transportation. But he, as an *individual,* has to be shown. Publicity of fifty-seven varieties reaches him daily. Most of it positively does not register, for the senses allotted to the perusal of what he receives from all angles are as dulled as his letter opener. The constant repetition of superlatives has defeated its object. The publicity to which I refer would pack a house to witness Lova Lott, in "A Bride's Confessions"; but it will not sell airplanes and, moreover, puts the industry in a false light to the man who needs airplanes and has the cash to pay for them. Such buying as he is doing is in spite of it.

But to return to A—— and his biplane. A—— spends three days in the town of M—— and is no doubt disappointed in not having relieved at least one resident of the price of an airplane. Were I to drop into M—— unknown, expecting to profit from a sale involving several or more thousands of dollars within three days, I fear that I would fail badly. Extreme good luck might favor me on occasion as it has in the past, and it may favor A——. Hopping from town to town would most certainly not help me, as I know from sad experience.

Upon reaching such a town as M——, I should spend several days at least, sometimes weeks, quietly seeking information of various sorts. In time I would become acquainted with and attach one or more parties who are well acquainted in the town. With the assistance of the "bird dogs" which I would locate; let's be frank about the matter—I would meet the flock leaders. If unable to sell them, I at least would have no opposition from them as a rule, and I would be unmolested among the flock. Towns such as M——, properly cultivated, will yield a sum of money which would astound Pilot A——. A good rule is, not to approach a prospect until you have learned all possible about him.

Moreover, in selling airplanes in M——, I would first of all dismiss the heroic togs and technical chatter. In other words stress the simplicity of flying rather than its difficulties. My "bird dogs" would be volunteers rather than paid performers. From them I would learn that B—— owns three widely separated hay ranches on which he winters six large bands of sheep. During the summer months his herds cover a territory larger than any one of several Eastern States. B—— would in due time find himself in an airplane, and at the end of a half day, have viewed all three ranches and the six bands of sheep. B—— is progressive enough to realize the value of an airplane in seeking lost sheep, watching waterholes, delivering supplies and keeping his herders on their toes. I've sold long enough to believe that B—— can be sold an airplane and instructions. Cost won't keep him on the ground when he can make money and save days of time by flying. A mere joy hop with B—— as a passenger would prove a waste of time.

C—— is an overworked doctor. His patients call him to all parts of the country. C—— is a good prospect for a cabin job, and to sell him I would demonstrate how easily and enjoyably it is possible to get from hither to hence by air, on actual calls, and also stress his need of relaxation. Doc isn't so busy that he could not find an hour per day for instruction and he's got the price.

D—— is a wealthy young matron who as yet has not been accepted by the elite

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AERO DIGEST

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SPEED, SAYS DAVIDSON; *CERTAINLY*, SAYS SHOENHAIR

F. TRUBEE DAVISON, Assistant Secretary of War for Aviation, on February 7th called the attention of America's air industry to the fact that, after all, speed is the thing which the American people first require of air transport. He felt, he said, that in recent years American aviation has not been supplying transport at sufficient m. p. h. to convince the public that aeronautical weight carrying really is up to snuff. And, of course, he was quite right. What is asked of air travel is weight-carrying at high speed, something far more than duplication of or a slight improvement on the rate of surface transit.

That reasonable statement came from the ever reasonable Trubee on February 7. And weight-carrying at high speed ensued, for on February 20th, at Jacksonville, Lee Shoenhair, late of the Army, now chief pilot for the Goodrich Rubber Company, brought back to America six speed records for airplanes carrying added weight up to 1,000 kilograms. These laurels, he snatched from the complacent brows of England and France. It is fortunate for American aviation that we have men like Trubee Davison, who will not hesitate to speak when they see errors in the making; it is also fortunate that we have pilots like Shoenhair.

A CRITICAL MOMENT FOR AIR MAIL

A CRITICAL moment for the United States air mail service will come May 5, when expirations of existing air mail contracts begin. At that time we shall be in need of new legislation so designed as to permit the industry to grow thrivingly, rendering efficient service and earning reasonable profit for such service rendered. The existing law needs to be changed, for though it is satisfactory in some details it is otherwise in others. Existing legislation concerning air mail contracts works well enough in certain details, but fails to assure permanence for any of the major passenger routes now operating. This situation is most undesirable, yet any plan involving the termination of existing contracts and a complete reorganization of the service, readvertising a new system of air mail lines for such bidders as might desire to compete, would be much worse, for it would be unfair to those whose money has been heavily invested in the present lines.

A new deal is essential, not because anything has been seriously wrong with the old, but because a new plan is necessary to fit changed conditions resulting from the tremendous growth of the air mail.

The matter is of a sufficient seriousness to justify a general interest. With contracts for air mail rapidly terminating (the only air activity which has paid substantial profit) and with passenger and express business, though steadily increasing, still insufficient to carry any heavy burdens of slack business, it is obvious that at best several years must elapse before the nation has a comprehensive network of airlines. The continuation of air mail contracts under present conditions would keep the industry healthy in spots only; their termination, to be followed by readvertising, would enforce serious loss, with a general collapse of the entire transportation system sufficient to have an adverse effect upon airplane manufacture. This would threaten in a vital manner, not only the national commerce, but the national defense. For both an extensive and substantial list of profit-earning airplane manufacturers is fundamentally essential.

The savior of the situation seems to be contained in the provisions of the Wattres Bill (H. R. 9500). This bill would extend to the air mail system the practice which has been effective in the railway mail service, with the added provision that, within certain limitations and under certain circumstances, the Postmaster General could fix the rates of compensaton to be paid to operators. He could contract for mail space on any established air mail, air express or air passenger line, and could dictate whether, and what other service, if any, would be rendered by carriers of air mail.

This bill is now before the House Committee on the Post Office and Post Roads, whence it is expected to issue before long without amendment of any detail, and a similarly unobstructed progression is predicted for it in the Senate. It can and should be enacted into law before that date on which first expirations of air mail contracts occur.

In the opinion of Aero Digest this bill supplies a plan in general desirable. But it must be remembered by everyone concerned that the right and efficient functioning of the system it proposes to create will depend upon an able and impartial administration of its various provisions.

EXPORTS

OUR airplane exports for the year 1929 established a new record. In foreign markets we sold 354 planes for $5,574,480, an increase of 200 per cent over the previous year's business. Likewise, a satisfactory gain was made in the export of engines and parts. This progress in export business should be a powerful stimulant to the entire American airplane industry; it is less important as an accomplished fact than as proof that greater things can be accomplished through increased effort. At best we have done only just enough to convince England, Germany, France and Italy that we somewhat vaguely contemplate real competition with them in the Pan American market. Probably we have not yet done enough really to alarm them. The situation as it stands should be accepted merely as a signal to get up and hustle.

These able European nations will not give up without a fight; they will not give up at all, in fact—which is a good thing for everyone concerned, for in this matter competition is not only the life of trade, but the greatest stimulant to progress.

By virtue of the fact that modern aviation is an American creation, the world market rightfully belongs to us. If we do not secure it and retain it, the fault will be our own. Every worth while aircraft manufacturer in England is being earnestly encouraged both by the bankers and the heads of Government to exert every possible energy in an endeavor to keep America's aircraft industry at a minimum in these outside markets. Such a course, moreover, is entirely legitimate and commendable—from the British point of view. OUR point of view should be that WE propose to develop, through intensive work, this vast market to the South of us, and, having developed it, to retain it through superiority of product and of selling enterprise.

GETTING DOWN TO EARTH

An Interview With James M. Russell

By Charles J. V. Murphy

James M. Russell

THE modern parachute has had a bizarre history; it has carried several hundred pilots from certain death, within the past nine years. A curious fact about it, though, is that it was ridiculed so long by pilots; antedating heavier-than-air craft by more than 100 years, the parachute became its true life preserver less than a decade ago.

There are many reasons for that, James M. Russell told me, when I talked to him in the office where he presides over his factory at San Diego. Getting people down to earth is Russell's business, and he has witnessed and participated in the development of the parachute to modern form. When he began to fly in 1915, pilots were a sentimental lot. Flight to them was a sincere, beautiful thing—not a matter of bread and butter. And they would have nothing to do with a device that seemingly disavowed their own faith in flying machines. A man who took up an airplane, they argued, ought to have courage enough to bring it down.

"There was still another reason," Russell explained. "What parachutes there were on the market were haphazard devices, a patch of canvas secured to an arrangement of ropes. Their pretenses were modest. They were simply thrill-makers at pumpkin fairs. Young men willing to do anything for a cheer and a bit of money jumped them from the hot air balloons one used to see at every country fair.

"They were dangerous withal. Frequently they fouled or failed to open. Casualties were heavy. So it is not difficult to comprehend why pilots, flying fairly fast machines, were hesitant to adopt them. They would rather stick to their machines as long as a bit of wing held to the struts."

When all others were inclined to let the parachute lag, the United States Army Air Service had the courage and wisdom to foresee its practical need. Convinced that safety in aircraft required a means for safe escape from disabled machines, it set up a laboratory at McCook Field in 1919, put Major Hoffman in charge, and told him to build a parachute that would be safe, dependable and positive.

The manner in which it was accomplished is one of the untold romances of modern aviation.

Nearing the earth

"If I tell you that none of us engineers knew anything of the parachute," Russell chuckled, "you won't believe me, but it is true. I had just come from the Dayton-Wright factory, where I had been flight-testing DH's. Floyd Smith was a pilot. Jimmy Higgins had been an automobile salesman. Guy Ball was an engineer. Of us all, only Sergeant Ralph Bottriel, a balloon expert, had ever made a parachute jump of any kind.

"So we started to learn the parachute business from the ground up, a queer beginning, but the only wise one. For the parachute was an unknown art. There were no factories in the country, no table of statistics to which we might have gone for information. There being no alternative, we simply followed the time-worn precepts of those historic twins, trial and error.

"Our first step was to gather up every parachute we could lay our hands on, here and abroad. We put these to tests, found what was good in them, and what was bad. It wasn't very long before we realized that all of them were inadequate for high-speed airplanes.

"In the first place, these 'chutes were of the attached type. They operated mechanically. The canopy—or parachute proper—was packed in a container either worn on the aviator's back or slung to the bottom of the fuselage. In some cases this container, or pack, fitted snugly to the harness.

"The device worked in this manner: A heavy rope, anchored on one end to the plane itself, was fastened to a loosely secured panel in the outer face of the pack. Within the closed pack, a more fragile rope secured the peak of the folded canopy to the inside face of the panel. This was the arrangement when the pack was folded and the aviator in the plane.

"When he jumped, his body fell the length of the heavy rope, where the shock naturally ripped out the loosely secured panel. The second and lighter cord still was secured to this panel, and as the pilot continued to fall it drew the parachute into open position. The whole business therefore was strung out, and the lighter rope of course broke immediately.

"Theoretically, the idea was perfect. In practice it was anything else but. Stories of ghastly failures had come out of the war. Shroud lines had fouled; aviators had been drawn down with falling machines; one, indeed, had been whipped into the propeller.

"Obviously, a disabled machine could not be depended on to operate a parachute. The conditions which caused aerial disasters—spins, disintegration of the machine, collisions—provoked the most unfavorable circumstances for the use of this attached type of parachute.

"We concluded that the perfect parachute must be independent in operation, 100 per cent manually operated."

Out of that decision came the Army Air Service parachute, which revolutionized the art. The attachment cord was abandoned. A two-foot cord, appropriately called the rip-cord, running from the back of the pack to a ring within reach of the hand, took the place of the heavy breaker rope. The addition of a small pilot 'chute, released by an automatic spring, served to whip the folded parachute into the airstream.

A desperately limited definition, I confess, for an involved development, but it must serve here. To do justice to the laborious testing of materials, the actual design of pack and harness, the calculation of how it would withstand stresses, would require a book. Suffice it to say that the first free type parachute was ready for aviation.

The finest of silk went into the canopy. The harness was designed to distribute the shock of opening about the body, with the least possible pressure at any given point. The whole thing weighed only twenty pounds. Theoretically it was capable of offsetting any kind of aerial emergency.

"I tell you we were an anxious and worried group when that first 'chute was ready for testing," Russell continued his narrative. "For months the pilots at the field had regarded us as a bunch of crackpots, they had so little faith in the parachute. We had to prove to them that we were right.

Sixty-foot Russell lobe parachute for lowering a complete airplane

"Moreover, there was a moral need for haste. During the progress of our experiments no less than half a dozen fine young pilots had cracked up almost at our doorstep. That was the pity of it. We felt in our hearts that this parachute, if it had been ready, would have saved them. We were so convinced, in fact, that every man in the Parachute Section was ready to take the 'chute right on and jump it, willy-nilly.

"But Major Hoffman, a wise engineer and a fine officer, said no. He ordered us to run tests with lead-weighted dummies. For the next month or so, we religiously carried these bulky robots aloft and pitched them out of the cockpit. It was tough work, believe me. These dummies ranged in weight from 100 pounds to 250 pounds, and handling them in the cramped cockpit of a plane traveling 100 miles an hour was a job for a couple of piano movers."

I did not ponder at Russell's complaint. Rather I marvelled that he was able to handle them at all. He weighs no more than 120 pounds, and he weighed even less in 1919.

Still, the tests were not without satisfaction. The 'chutes worked. Opened nicely, quickly, and brought the listless dummies safely to earth, no matter what the conditions under which they were pitched overboard, whether from loops, spins, dives or rolls.

Major Hoffman finally gave his permission for the "live drops."

Leslie Irvin, who had come to McCook to show the engineers his own attached type parachute, tarried long enough to try out their own. At 1,200 feet, he "bailed out" of a DH. The group of engineers who created it watched his body fall, flatly, twisting, gathering speed.

Would it work?

Before their dry throats could frame the question, the 'chute bustled out of the pack, strung aloft and opened. The descent was checked. A minute later Mr. Irvin touched earth. Then the engineers took their turns.

"I was a little bit worried when mine came," Russell confessed. "I had never made a jump before—in fact, had sworn I never would. It had always seemed a silly business, like jumping before a street car just to see what would happen to you if you accidentally found yourself in front of one. But since I was apparently in the business for keeps, I decided I had better see what made the wheels go round.

"We leveled off at 1,100 feet, and I gave the pilot the signal that I was ready to go over the side. From the cockpit the earth seemed awfully near and hard. Awfully hard. 'Here goes nothing,' I assured myself, and jumped out, head first.

"My body swept into a loop, and as sky showed between my heels, I observed that the plane was making off to the right. There being no danger of my 'chute becoming fouled in the tail, I yanked out the rip-cord. The 'chute streamed out nicely, took hold and swept me erect. After that, everything was lovely.

"I came in quite gently, landing flat on my face."

It would be rather fitting to chronicle here that aviation clapped its hands and said, "Bravo!" But no, life isn't quite like that! Hardly ever are the skeptics won over with the first success.

"In spite of the success we had with our test jumps," Russell said, "the fliers themselves were unconvinced. They had no end of crazy theories. One was that the parachute would be blown to pieces at high speed. Another was that it wouldn't work in the rarefied air found at high altitudes. A third was that it wouldn't work quickly enough to save them at low altitude. And the fourth—and the most persistent and fallacious of all—was that you lost consciousness the moment you began to fall and therefore wouldn't be able to operate the 'chute anyway.

"Theories, charts and dynamics couldn't blast those notions away. Taking infinite pains, Major Hoffman proved mathematically and practically that, contrary to popular theory, a body falling freely in atmosphere reached a terminal velocity of 118 miles an hour and no more, due to air resistance.

"The only trouble with that argument, as with the others, was its technicality. Like the gentlemen from Missouri, pilots had to be shown."

Sergeant Bottriel, old enough to have fathered most of his colleagues, undertook to dismiss the bogy of high altitude. Reasoning with his

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THE STUDENT'S ATTITUDE IN PRIMARY FLYING INSTRUCTION

By Storm Archer

Storm Archer

SINCE the early days of flying there has been a lack of understanding between the flight student and his instructor.

The student frequently is unable to orientate himself to the new element and is apt to pass very lightly over the primary instructive talk which is given on the ground or, as is often the case, forget the talk entirely. Since it is in these talks, however, that the instructor gives the student the first impression of flying and brings out the points that are of the utmost importance in the making of an apt and receptive pupil, it is therefore imperative that the student remember them and benefit by them. As is often the case in the air, the instructor's corrections of certain movements of the airplane resulting from the student's mistakes are wasted entirely and must be repeated time and time again for the simple reason that the student does not understand or see the mistakes he makes and therefore is unable to correct them of his own initiative. Nor does the student know just what he is to strive to attain, and as a result, rivets his entire attention on the airplane and its controls rather than on the instructor and on orientating himself to the new element.

Since flying is so unlike anything the student ever did before, the result almost invariably is that it is difficult for him to do even those things that the instructor tells him in the air.

Having attempted to analyze his instructor's flying, it is but natural for the student to try to simulate the flight when he is given the controls. That then will lead him to analyze his own flying and to recognize and correct errors without undue repetition.

Commercial instruction differs so widely from military, even in the very elementary stage, that a comparison of it with methods used by the Army and Navy cannot be attempted.

The method of selecting students and taking only the very best is economically impractical. The commercial student is willing and anxious to pay for his instruction, and the flying school is willing and anxious to have the student's money, provided, of course, he meets the standard mental and physical requirements. Therefore, the commercial instructor must do the best he possibly can with such material as is sent to him from the flight office. That is a serious handicap; for not every person can be made a good pilot. It has been generally supposed that anyone who was able to pass the physical and mental examinations could, if sufficiently instructed, become as safe and proficient a pilot as anyone else. But such has been proved not to be true. Steps have been taken to determine the reasons for some students' apparent inaptitude in flying. In recent years several causes, both mental and physical, have been found which were not considered in the earlier days of aviation. Prospective fliers with shortcomings are now being eliminated by the medical examiner; but even among those apparently perfect mentally and physically there is still inaptitude to be found, and only the flight instructor can discover it.

It is also true that even those considered the worst cases can after intensive training be taught to fly an airplane, but they never can be made into good and safe pilots of airplanes, because they lack the instinct for quick action in an emergency. An inept pupil can at the very best become a mechanical flier who must plan in his mind each and every move to be made before he attempts any maneuver—but in an emergency there is no time to think or plan and a mechanical flier is immediately out of his element.

Commercial students who are told by their instructors that they are inept in any stage of their training, should, for their own sake and for the public's sake, discontinue their instruction.

Since flying requires the development of new senses and perceptions and creates experiences unlike anything the normal individual has ever experienced before, there is no memory in the mind with which the new experience may be associated. Therefore, the psychological reactions are for the time on the basis of original perception. Many students show decided indications of mental sub-normalities when in the air, although their minds appear to function normally while they are on the ground.

Progress in flying ability then depends upon the student's development of the new senses and varies with his power to withstand disturbances to his process of perception, mental impulses and automatic responses. That student has natural aptitude for flying who can sense the loss or gain of speed, centrifugal force and sustentation, and who can easily adapt himself to sudden changes in any or all of them. That student has natural aptitude whose instinct of self-preservation is retarded enough not easily to arouse defence activities, and can therefore disregard the element of danger in flying, whether real or imaginary. Such a person will never become rigid and unable to move when danger threatens. A student whose instincts of exploration and curiosity are strong and active, and who is not over-cautious or slow but whose body always remains relaxed while his mind is fully alert, has natural aptitude.

Natural aptitude is also characterized by the ability to coördinate mind and muscle subconsciously so that movements of the body are made unconsciously while the conscious mind is concerned with other matters. In other words, such a man will feel and accurately measure the weight on the control surfaces due to speed and still have a delicate touch on the control stick to feel the pulse of the plane and motor.

Further, natural aptitude is characterstic of one who is able to orientate himself to unusual positions and whose mind is not clouded by fear but whose mind and nerves remain well controlled under the most trying conditions.

All the above faculties combine to make a naturally apt flight student. One part of natural aptitude is often described as "the feel of the ship." The student is said to have acquired the feel of the ship when he can sense the gain or loss of speed, centrifugal force, and sustentation, etc., and who is relaxed and light on the controls, with a reflex muscular action which responds to what he sees and feels without his having to think about what to do.

The mechanical flier is one who has none of the above qualities, but who must first see or feel a thing, analyze it in his mind for right or wrong, think up what to do and finally have his brain signal his muscles to make the correcting motions. All that of course takes considerable time. Since it is necessary for him to think and reason the thing out, he may not always think right, and therefore may after all use the wrong control, or if right, use too much or too little.

Since the feel of sustentation in flight is a newly discovered sense, people in general do not know the difference between a natural and a mechanical flier.

There is, for instance, no sport which requires or develops the sense to feel just when the lift has become equal to the weight and flight has begun. Nevertheless, some students develop it after a very few hours, whereas in other cases the sense is still absent after hundreds of hours. A person of the latter type is forced to depend upon the sound of speed through the wires or the air speed indicator on the feel of wind pressure. Thus, a mechanical flier must depend upon his three senses: hearing, sight and feel for sustentation in flight. Of course, such a pilot is unsafe. On the other hand, the person who has the sense of sustentation unconsciously knows just when the plane is ready to leave the ground and also subconsiously knows the instant that a plane is about to lose its lift and spin or fall. Just as subconsciously, he prevents it from falling or spinning.

The theory of flight is a science, but its practical application is an art. The flying instructor must consider many things of which the teacher of science need never think. A student of science may learn even though the classroom is uncomfortable and the student in ill health, but if the flight instructor does not see to the bodily comfort of his pupil and know that he is in a receptive frame of mind, the instruction is just time wasted.

The student may assist the instructor by making himself comfortable in the plane, by sleeping regularly a minimum of ten hours per night while taking instruction, by dressing warmly and eating regularly, and last but not least, by retaining full trust, confidence and respect for his instructor.

A student should be careful not to be an "alibi artist," cocky or over-confident, nor to seek to do or receive personal favors for or from the instructor. Rather, he must realize that the instructor has certain information and knowledge which he is to impart to the student who, therefore, should be attentive and maintain a high degree of zeal. A student must not be timid, but must ask questions freely and without restraint. Nor must the student depend too much upon the instructor while flying, but must use his own initiative to get out of minor difficulties. Nor should students under any circumstance resent advice or offer excuses for mistakes made—mistakes are expected.

The most important of the minor details which must be considered by the student before going into the air is personal comfort. Clothing must be worn which is warm but not bulky and heavy, else a hampering effect of muscular movement may result. Helmet and goggles must be carefully adjusted so that they fit snugly yet not too tightly. A pinching helmet or goggle strap may divert part or all of the student's concentrative powers away from the plane.

The student should take care that his seat is comfortable and high enough to afford clear vision forward and to both sides without the necessity of his stretching or leaning to either side. If the seat itself is too low, the student should supply himself with a cushion of such a size and thickness as is required to raise his head to a proper level. Care must be taken that the cushion does not overhang the forward edge of the seat where it may interfere with the movements of the control stick.

The control stick must be within easy reach, so that it is not necessary for the student to lean forward in order to use the stick. Similarly, the rudder bar must be within a distance from the seat that does not require the student to extend his leg to the limit in order for him to apply full rudder.

It is beneficial for the student to spend quite some time in the cockpit of a plane before going for his first instruction flight. During this time he should move the control levers to some position and then turn to see the relative position of the control surfaces.

By imagining a flow of air passing over the wings and tail surfaces the student can easily understand the effect each control movement may have on the plane while in flight.

Whenever a matter concerning the airplane or its operation is not clear in the student's mind, he should ask questions freely and sensibly. The instructor will take interest in explaining to his pupil whenever the student's power of deduction fails to satisfy the instincts of curiosity and exploration. Every student does well to remember that the instructor cannot guess what is not understood by his pupil and that he expects his pupils to ask questions. On the other hand, the instructor should not be looked upon as an oracle but should be held in reserve by the student until he feels that he no longer alone can reach a logical answer to a question that has arisen in his mind.

Even in the air the student should strive to accomplish a requested maneuver without waiting for demonstrations from the instructor, then try to eliminate faults exposed by corrections, one by one.

The first problem the student is confronted with when beginning to fly is that of relaxing and feeling at ease in the plane. The student should sit erect but not stiffly. Every muscle must be relaxed completely. As soon as he begins to turn in his seat to look to the right, left or down while flying the plane, his mind becomes occupied by what he sees more than by what his hands are doing and the sense of subconscious reflex muscular action becomes developed.

Errors in keeping the plane on its course due to the student's attention being elsewhere can easily be corrected by practice in maneuvers which require precision of control, but should stiffness of the body and concentration of the mind on the controls become habits, they are detrimental to whatever natural aptitude the student may have for flying. Since every student has a tendency to rivet his attention on the plane, there is very little danger that he will forget it entirely in his interest to look about.

Nearly every modern airplane is designed so that it will fly straight and level without anyone holding the controls. Consequently, there is no necessity for the student's retaining a firm grip on the control stick. On the contrary, the stick should be held only with the thumb and two fingers. Then the throb of the motor and the life in the plane can be felt through the stick.

If a student can but learn on his first flight to relax completely and to hold the controls correctly, he may be assured of a short instruction period.

THE GROUPING OF AIRCRAFT COMPANIES

By Ralph L. Woods

AVIATION is no longer a small or untried business. Prominent bankers are backing large aviation companies. Great automobile firms are beginning to take both an active and financial participation in aviation. Powerful aviation holding companies have been formed. Vast sums have been poured into all phases of flying. Air transportation is today so important that the large railroads of the country are operating joint air-rail schedules and even competitive train services.

What does all this mean? Boiled down, it means that aviation is no longer an infant industry, but a lusty, growing youth, a vital factor in the economic and commercial life of the nation. True, the industry may be combatting a sort of crisis at present, but it is sufficiently well founded to survive it. Bankers no longer politely conceal a snicker when the aircraft manufacturers come to them seeking capital. The "swaddling clothes" stage has gone. The era of skepticism is past. Aviation is on the ascendancy, and it will go far and reach unthought of heights in a few years. It is truly a big business.

These are the principal factors making for the further stability, expansion and prosperity of the aviation industry, and they should be emphasized particularly at this time when the industry is going through a period of retrenchment and readjustment that is a natural and logical part of its growth.

Of all these factors the most significant is the trend toward mergers through the creation of huge holding companies for the acquisition of various aviation companies. This movement has so far resulted in four principal groups being formed, each under different financial auspices. They are the Aviation Corporation, the Curtiss-Wright Corporation and allied interests, frequently referred to as the Keys-Hoyt Group, the Detroit Aircraft Corporation and the United Aircraft and Transport Co., Inc.

There are many benefits to be derived from the merging of so many and varied interests into a single and cohesive organization. Among these are the confidence they inspire in the stability and permanence of aviation, the far reaching economies that are effected within the organization, and the availability of extensive capital for expansion. But perhaps most important is the pooling of engineering brains and research facilities for the attainment of a quicker and more complete victory over the obstacles that still remain to be conquered before America takes its true place in the skies. It must be recognized that these benefits obtain not only for the particular organization that creates them, but for the aviation industry as a whole, and for industry and commerce generally.

The Curtiss-Wright Corporation, with its allied interests, is perhaps the largest group. The companies in that group represent a total original investment of more than $150,000,000. Forty-one companies are in the group. The transport lines stretch out over 6,902 miles of domestic airways and approximately 11,000 miles of foreign air routes. Thirteen factories have a present production capacity of 350 planes and 1,150 engines per month, and about thirty-four airports are owned and operated by the group. The group enjoys the backing of the financial houses of Heyden, Stone and Company, Grayson M. P. Murphy and Company, Blair and Company and J. C. Willson and Company.

Besides manufacturing and transport, this group is interested in flying schools, extensive domestic and foreign sales organizations, aerial taxis, accessories, installment financing of planes, airports and seven investment companies.

Although the integration of this group is great, the financial structure is flexible. Up until a few months ago the Curtiss Aeroplane and Motor Company was controlled by Clement M. Keys and his associates and the Wright Aeronautical Company was controlled by Richard F. Hoyt, partner of Heyden Stone and Company. These two companies, at that time, headed two distinct aviation groups. With the merger of these two companies, the Curtiss-Wright Corporation, a holding company, was formed and other Keys and Hoyt interests were also brought into this new holding company. Thus were the two groups united.

This arrangement still left a number of other Keys and Hoyt companies outside the Curtiss-Wright Corporation. Nevertheless, the latter companies are considered as being within the group because the same personalities, the same banking houses and the same community of interests continue to exercise the unifying influence and direction that prevailed when there were two groups.

Among the transport lines of the group is Transcontinental Air Transport-Maddux Air Lines, Inc., which operates air-rail service between New York and the Pacific Coast in connection with the Pennsylvania Railroad and the Santa Fe Railroad. Other important lines are National Air Transport, which operates the mail routes between New York and Chicago and between Chicago and Dallas, Tex., and Eastern Air Transport, Inc., which flies between New York and Miami via Atlanta and Jacksonville, Fla.

An interesting item about the group's operations, and one that will indicate the extent and diversity of its activities, is that concerning the Aviation Exploration, Inc. This company recently signed a contract with the Nationalist government of China which calls for the establishment of 3,300

LIST OF PRINCIPAL
THEIR SUBSIDIARY AND

KEYS-HOYT GROUP

(CW) *Unit of the Curtiss-Wright Corporation*
(NA) *Owned by North American Aviation, Inc.*

Engineering and Manufacturing

The Curtiss-Wright Corporation
  Wright Aeronautical Corp. (CW)
  Curtiss Aeroplane and Motor Co., Inc. (CW)
  Keystone-Loening Aeronautical Corp. (CW)
  Moth Aircraft Corporation (CW)
  Travel Air Company, Inc. (CW)
  Curtiss-Caproni Corporation (CW)
  Curtiss Robertson Airplane Mfg. Co., Inc. (CW)
  Reed Propeller Company (CW)
Cessna Aircraft Corporation
Curtiss-Reid Aircraft Corp., Ltd.
Sperry Gyroscope Company (NA)
Ford Instrument Company (NA)

Sales and Service

Aviation Credit Corporation
Curtiss Aeroplane Export Corporation (CW)
Curtiss-Wright Flying Service, Inc. (CW)
Curtiss-Wright Sales Corporation (CW)

Airports

New York Air Terminals, Inc (CW)
Aircraft and Airways of America, Inc.
  owns Servair, Inc., and Reading Airways, Inc.
Curtiss Airports, Inc. (CW)

Finance

Aviation Securities Corp. of New England
Aviation Securities Corporation
Aviation Corporation of Calif.
National Aviation Corporation
  controls Aeronautical Industries, Inc.
North American Aviation, Inc.
Curtiss Assets Corporation
St. Louis Aviation Corporation

Transport

Transcontinental Air Transport-Maddux Air Lines, Inc.
National Air Transport, Inc.
Eastern Air Transport, Inc. (NA)
Aviation Exploration, Inc.
China Airways Corp. of New York
Intercontinent Aviation, Inc.
Varney Airlines
New York and Suburban Air Lines (CW)

THE AVIATION CORPORATION
(of Delaware)

American Airways, Inc. (holding company)

Colonial Airways Corp. (holding company)
  Colonial Air Transport, Inc.
  Colonial-Western Airways, Inc.
  Canadian-Colonial Airways, Inc.
  Colonial Flying Service, Inc.
Universal Aviation Corporation
  Robertson Aircraft Corporation
  Continental Airlines, Inc.
  Northern Airlines, Inc.
  Braniff Airlines, Inc.
  The Central Airlines Company
  Robertson Flying Service, Inc.
  Midplane Sales and Transit Company
  Egyptian Airways Company
  Universal Air Lines System Terminal Co.
  Air Transportation, Inc.
  Northern Aeronautics, Inc.
    (Minority interest in Northwest Airways, Inc.)
Southern Air Transport Co., Inc.
  Gulf Air Lines, Inc.
  Texas Air Transport, Inc.
  S. A. T. Flying Service, Inc.
  T.A.T. Flying Schools, Inc.
  Southern Aeromotive Service, Inc.
  Dixie Motor Coach Corporation
Alaskan Airways, Inc.
  Wien-Alaska Airways
  Bennet-Rodebaugh Airplane Co.
Cuban Aviation Corporation
  Servicio Cubano de Aviación
Embry-Riddle Aviation Corporation
  Embry-Riddle Company
  Norton Field, Columbus, Ohio
  Columbus Flying Service
Interstate Airlines, Inc.

Fairchild Aviation Corporation

Fairchild Airplane Mfg. Co., Inc.

AIRCRAFT GROUPS
AFFILIATED COMPANIES

Fairchild Aviation Corp.—(*Continued*)
Kreider-Reisner Aircraft Co., Inc.
Fairchild Aerial Camera Corporation
Fairchild Aerial Surveys, Inc.
Fairchild Aircraft, Ltd.
Fairchild Engine Corporation
Fairchild Flying Corporation
Fairchild Flying School
Aviation Shares Corporation
Aviation Patent and Research Corp.
New York Aviation Corporation
Roosevelt Field, Inc.

UNITED AIRCRAFT AND TRANSPORT CO., INC.

Pratt and Whitney Aircraft Corporation
Canadian Pratt and Whitney Aircraft Co., Ltd.
Boeing Airplane Company, Inc.
Chance Vought Corporation
Hamilton Standard Steel Propeller Company
Stearman Aircraft Corporation
Hamilton Metalplane Company
Sikorsky Aviation Corporation
Northrop Aviation Corporation
Hoffar Beeching Shipyards, Ltd., of Vancouver, B. C.
United Aircraft Exports, Inc.
United Airports, Inc.
Boeing Air Transport, Inc.
Boeing School of Aeronautics, Oakland, Calif.
Pacific Air Transport, Inc.
Stout Air Lines, Inc.

DETROIT AIRCRAFT CORPORATION

Aircraft Development Corporation
Aviation Tool Company
Ryan Aircraft Corporation
Aircraft Parts Company
Grosse Ile Airport, Inc.
Marine Aircraft Corporation
Blackburn Aircraft Corporation
Eastman Aircraft Corporation
Lockheed Aircraft Corporation
Parks Aircraft, Inc.
Parks Air College
Gliders, Inc.
Detroit Aircraft Export Corporation
Winton Aviation Engine Corporation (40% stock interest.)

ALLIED MOTOR INDUSTRIES, INC.

American Cirrus Engines Company
American Aeronautical Corporation
Great Lakes Aircraft Corporation
Van Sicklen Corporation
Weatherproof Body Corporation
Henney Motor Corporation

WESTERN AIR EXPRESS

Aero Corporation of California
West Coast Air Transport
Mid-Continent Air Express
Standard Air Lines, Inc.

BENDIX AVIATION CORPORATION

Bragg Kliesrath Corporation
General Instrument Corporation
J. P. Marsh and Company
American Paulin System, Inc.
Tiffany Manufacturing Company
Pioneer Instrument Company
Stinson Brake Control Mechanism
Bendix Brake Company
Bendix Service Corporation
Bendix Cowdry Brake Tester, Inc.
Eclipse Machine Company
Delco Aviation Corporation
Eclipse Aviation Company
Eclipse Textile Services, Inc.
International Germandt Motors, Ltd.
Scintilla Magneto Company
Stromberg Motor Devices Company
Stromberg Research Corporation

(*Continued on next page*)

miles of air mail lines in that country and which also permits the erection of aircraft factories and the opening of flying schools.

The planes and engines of the group's twelve manufacturing and engineering units are enough to meet most every purse and purpose. The planes range from the tiny D.H. Moth to the commodious Keystone Patrician and the eighteen-passenger Curtiss Condor. The engines, which have a parallel range, include the Wright Whirlwind and the Curtiss Challenger.

Large and small amphibions and military planes are manufactured by the Keystone-Loening company, and the Curtiss-Caproni unit is engaged with ambitious plans for the production of huge transport planes. Travel Air, Cessna, Curtiss-Robertson and Moth are concerned with the production of small and medium-size commercial ships.

The marketing of the vast output of these plants is handled through four sales and service companies, chief of which is the Curtiss-Wright Flying Service. This organization has bases of operation at key positions throughout the country, and besides the selling of planes, it has extensive facilities for servicing them. It also operates many flying schools and aerial taxi services.

Foreign sales are handled by the Curtiss Aeroplane Export Corporation which has an extensive and rapidly expanding organization in South America, Europe and other countries. Taking a leaf from the automobile business, the Aviation Credit Corporation was formed by the Keys-Hoyt interests for the financing of installment sales of planes. Curtiss-Wright Sales Corporation handles wholesale distribution exclusively.

So that they might have airports available to take care of their many activities, this group formed the Curtiss Airports Corporation to establish a nationwide chain of airports. Thus far they have acquired sixteen carefully selected sites.

The activities of the group are rounded out by the investment, or financial, units, of which there are six, representing an original investment of more than $37,000,000. These corporations are strategically located in different parts of the country, and though not confined in their operations to their geographical location, they aim to give specialized attention to their own particular part of the country. Their principal functions are to underwrite, finance and invest in worthy aeronautical enterprises.

Some Wall Street authorities expect that eventually those companies of the Keys-Hoyt group not now included in the Curtiss-Wright Corporation will be placed under the wing of holding companies which it is expected will be formed at some future date. This will naturally result in a firmer control of the companies and will make for still greater co-operation between them.

The United Aircraft and Transport Company, Inc., is a holding company formed in the latter part of 1928, under the sponsorship of the powerful National City Bank of New York. Its progress in acquiring a good part of the cream of the aviation industry has been little short of amazing. Its position is unique in that it has from the very beginning shown good earnings on its capitalization. Unlike the Keys-Hoyt group, the United Company exercises an absolute control over every company under its guidance.

One of the outstanding among these subsidiaries is the highly successful Pratt and Whitney Aircraft Company of Hartford, Conn., which manufactures Wasp and Hornet aircraft engines. This company's progress has been such as to require the construction of a new plant which will double the present production capacity.

In the transport field, Boeing Air Transport has been eminently successful. For the two years ended July 31, the Boeing lines completed 6,000,000 miles of flight, 3,000,000 of which were at night. More than 10,000 miles are being flown daily by Boeing planes on the routes between Chicago and San Francisco, and between Los Angeles and Seattle. Boeing has over sixty-five planes in operation and transports thirty per cent of the U. S. Air Mails. An all-air thirty-hour Frisco-New York service is planned for early operation.

Pacific Air Transport, also part of the Boeing System, carries mail, passengers and express between Oakland and San Jose and between Los Angeles and Seattle, with plans to extend to Juneau, Alaska, thus making possible a four-day trip from New York to Alaska in connection with the United company's airlines from Cleveland west.

Through the Northrop Aviation Company, which has acquired the Avian Corporation, the United interests have just completed successful tests with a small all-metal flying wing airplane.

Of the other United companies, the Chance Vought Corporation limits itself to the production of military aircraft, and the Sikorsky company manufactures the large amphibions of the same name. Both Vought and Sikorsky are taking possession of new and larger plants in Connecticut. The Stearman unit of Wichita, Kan., is occupied with the production of medium-size passenger and mail planes, and the Hamilton division is well-known for its all-metal monoplane.

At one time, the Boeing Airplane Company was manufacturing military planes principally. But it is now building excellent mail planes and more recently placed in production a new high speed eighteen-passenger plane, twelve of which are being placed in service over the Boeing System. Through another subsidiary a factory is being constructed at Vancouver, B.C., for the output of flying boats.

Like the Keys-Hoyt Group the United company has formed an export company to facilitate the penetration of foreign markets. That company is known as United Aircraft Exports, Inc.

On March 31, 1929, United Aircraft and Transport reported total assets of $25,603,954. Unquestionably, this amount has been increased in the year that has elapsed, although no figures have yet been made public. The company's directorate includes representatives of Ford and General Motors, National City Bank and Standard Oil interests.

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It owns one-third of the stock of the Aviation Corporation of the Americas, which is the holding company for Pan America Airways, Inc.

OF more recent origin is the Aviation Corporation of Delaware, which was formed in March, 1929, as a holding and management company for the aviation industry. The company is backed by the large banking houses of Lehman Brothers and W. A. Harriman and Company, and its board of directors includes many men prominent in business and finance.

Starting business with $35,000,000, the Aviation Corporation has in the first year of its corporate existence gained a controlling interest in eight large aviation enterprises, and a number of smaller ones. As announced a few months ago, there is still a balance of more than $20,000,000 in cash and call loans with which further acquisitions and expansions may be made.

With 9,120 miles of established airlines, 291 planes in operation, thirty-one flying schools, and more than 2,000 employees, the Aviation Corporation has brought together the largest continuous air transport system in the United States, if not in the world. Its planes have a daily schedule of more than 20,000 miles, which is equivalent to twenty-five per cent of the country's total.

American Airways, Inc., is a new company created to take over the airline operations of all the various units. Under the new company they will be further coördinated and consolidated with a view to effecting greater economies and increased efficiency.

Of the twenty-five air mail routes in the nation under Government contract, eleven are operated by transport lines of the Aviation Corporation. In addition, it holds the contract for one foreign mail route and one Canadian mail contract. Aviation Corporation planes flew 5,657,929 miles in 1929 scheduled operations, while passenger planes flew a total of 2,301,221 miles and carried 20,659 passengers.

The outstanding unit of American Airways, Inc., is the Universal Aviation Company, which is best known by its trans-continental air-rail service in conjunction with the New York Central and Santa Fe Railroads. Operating multi-motored Fokker planes, this company now has under preparation a thirty-hour all-air service between the Atlantic and Pacific Coasts in connection with Western Air Express.

One of the features of the Aviation Corporation's transport system is that it is a continuous chain, one line tying in with another line of the parent company and, in many cases, connecting with airlines outside the group. Thus, Universal Air Lines has branches and subsidiaries which feed the main airway and connect with Colonial Airways at Cleveland and with Southern Air Transport at Atlanta. This latter company, which operates through the Southwest, connects at Brownsville, Texas, with the Mexican Aviation Company which flies to and from Mexico City, thus making a fifty-hour air-rail service between New York and Mexico City.

AIRCRAFT GROUPS

(*Continued from preceding page*)

AVIATION CORPORATION OF THE AMERICAS

- Pan American Airways, Inc.
  - *Mexican Aviation Corp.*
- New York Airways, Inc.
- Peruvian Airways, Inc.
- Pan American-Grace Airways

CONSOLIDATED AIRCRAFT CORPORATION

- Thomas-Morse Company
- Fleet Aircraft Corporation
- Kinner Aeroplane and Motor Co. (partial control)
- National Flying School, Inc.
- Frontier Enterprise, Inc.
- Niagara from the Air, Inc.

ALLIED AVIATION INDUSTRIES, INC.

- Mono-Aircraft, Inc.
- Lambert Aircraft Engine Corporation
- Royal Airways, Inc.
- Aviation Accessories Corporation

GENERAL AERO CORPORATION

- Holmes Airport Corporation
- Eastern Air Express, Inc.
- Swallow Airplane Company
- Gates Flying Service, Inc.

CORD CORPORATION

- Auburn Automobile Company
- Corman Aircraft Corporation
- Lycoming Manufacturing Company
- Stinson Aircraft Corporation
- Central Manufacturing Company
- Limousine Body Corporation
- Dusenberg, Inc.
- Columbia Axle Company

AMERICAN EAGLE AIRCRAFT CORPORATION

- Lincoln Aircraft Company, Inc.
- Porterfield Aviation Interests, Inc.
- Wallace Aircraft, Inc.
- Poterfield Flying School Corporation
- Crescent Propeller Company

AIR INVESTORS

- Comet Engine Company
- The Aircraft Engine Corporation
- United Aviation Corporation
- Scenic Airways
- Wyoming Airways

NEW STANDARD AIRCRAFT CO., INC.

- Atlantic Seaboard Airways
- Potomac Flying Service
- International Airways, Inc.
- Haines Point Seaplane Service
- Gettysburg Flying Service
- Hoover Field

ALEXANDER INDUSTRIES, INC.

- Alexander Aircraft Company
- Alexander Film Company
- Pyramid Film Company

SKY SPECIALTIES CORPORATION

- Heywood Starter Corporation
- Simon Airplane Appliance Company

The Aviation Corporation has made profitable use of motor bus lines to tap towns on either side of the airways and in that way serves a greater population.

Another unusually successful unit of the Aviation Corporation is Colonial Airways, which operates between New York and Boston, and between New York and Montreal with stops at Albany, N. Y. Other Colonial planes fly regularly between New York and Cleveland and between Buffalo and Toronto.

Of the other companies listed under this group, the Alaska Airways, Inc., was recently formed to take over two newly acquired transport lines in Alaska.

Roosevelt Field, on Long Island, is rapidly being made into one of the largest and finest airports in the country. Fairchild Aviation Corporation is the sole manufacturing unit of the Aviation Corporation. It manufactures a popular line of commercial and sport planes, as well as a number of important aviation accessories, including aerial cameras and a new inverted six-cylinder in-line air-cooled engine embodying many new features.

Apart from the companies which it controls, the Aviation Corporation holds minority interests in Bendix Aviation Corporation, the Aviation Corporation of the Americas, Fokker Aircraft Company, Waco Aircraft Company and Western Air Express.

THE last of the four major groups of aviation companies is the Detroit Aircraft Corporation, which was organized last June by a group of prominent Detroit bankers and industrial leaders, including Ford and General Motors representatives. The company started operations with $5,000,000 paid in capital. Thus far it has taken over fourteen companies.

It will readily be seen from the list of companies, that the Detroit group plans to confine at least its present activities to the production of various types of aircraft and engines.

One of its most prominent subsidiaries is the Lockheed Aircraft Company, which manufactures the well-known Lockheed Vega. The Ryan Aircraft Company is equally well known. Of great interest, too, is the Aircraft Development Corporation, which not long ago delivered to the U. S. Navy the world's first successful metal-clad dirigible. Such success attended this rather daring step that a still larger and more ambitious metal-clad dirigible is now under construction by this unit.

As the first of the larger aviation companies to become actively associated with the production of gliders, the Detroit company again demonstrates its capacity for leadership in the aircraft field. Its plants are located in Detroit, Cleveland, St. Louis, Los Angeles, and Orion, Michigan. The combined engineering brains and research facilities of these companies will undoubtedly make many worthy contributions to the advancement of aeronautics.

APART from this decided tendency toward mergers the most important phase of the growth of aviation is the manner in which the automobile companies, noting the direction of the wind, have entered aviation.

The story of Ford's aviation activities and contributions is too well known to be repeated. Not to be outdone, General Motors has become closely allied to the aviation industry. At present this huge corporation holds forty per cent of the stock of both Fokker Aircraft and Bendix Aviation. General Motors has also acquired the Allison Engineering Company of Indianapolis for the development of a Diesel type engine for

(*Continued on page* 213)

AVIATION AS TAUGHT AT THE UNIVERSITY OF MIAMI

As told to E. W. Sudlow

By Fred H. Given

Instructor of Aviation
University of Miami

A SUBJECT involving as many sub-divisions as does the study of aeronautics requires a different system of instruction than any other. It necessitates an efficient combination of training for trades and professions under one caption. It is the amalgamation of many forms of endeavor and requires more than forty different operations.

Althought aviation is in many respects practically a new field, it has experienced miraculous growth. The subject in all its branches is really a history of the successes, failures, experiments in flight, plane construction, landing field data and transportation operations. No wonder then that the student, upon his introduction to aviation, finds his subject new, interesting and fascinating. He is not always, however, prepared by his previous education to cope with the more difficult problems involved, and for that reason his course must in the beginning be elementary.

A new vocabulary of more than 350 words with which the student is usually only vaguely familiar must be mastered before he can know the language of aviation After the new glossary is acquired the student is ready to proceed to the many subjects yet ahead of him, such as:

Navigation; meteorology, by which weather conditions and storm movements are forecast; aerodynamics, the branch of dynamics concerned with the action of air on a moving body; the general theory of flight; power plants; structures; rigging and repairs; nomenclature; physics; principles of design; theory of acrobatics; Department of Commerce aircraft regulations; actual plane construction, by which the student is familiarized with the many trades and processes involved in the working of raw material into the finished product; field course, including the selection of sites for landing fields, grading and drainage, planning and maintenance, illumination; and parachutes, their operation, packing and care.

Without actual application of theory, the student has difficulty in understanding fully and retaining his text book knowledge. It is therefore necessary to supplement the lectures with drawings, diagrams and actual sight and operation of various parts of the plane.

Since it has been found that a broad general knowledge of aviation in its many details cannot be presented in less than 270 hours of lectures, "chalk talks," shop laboratory, with periods not longer than three hours daily, we have established at the University of Miami a course of eighteen weeks' duration which constitutes, as far as theory is concerned, the equivalent of a complete ground preparation for any aeronautic license. Such a course will also prepare the student for entrance into any of the specialized vocations involved in airplane manufacturing and maintenance. Since in our shop work every detail is carefully followed as in the construction of factory made planes, with all the productive processes actually reproduced, the students gain an intimate knowledge of this phase of the work.

By utilizing the other subjects taught at the university, such as aviation law, physics, chemistry, business advertising, etc., a student is able to specialize in any field he may choose.

Aeronautic students at Miami University (upper) hearing a chalk talk on navigation instruments and (lower) working on the construction of a plane; (center) a group of students at the Miami Municipal Airport

Although it is the policy of the university not to attempt actual flight training, the ships built in the shop laboratory are test-flown and a fleet of gliders now under construction will be employed for instruction in the principles of control operation in flight. It is, however, the policy of the university to experiment with and build planes of new types, to construct and test new types of devices, to encourage invention, and to produce improvements and safeguards. Inasmuch as each laboratory construction is the product of the students themselves, this system proves its worth and produces its badge of merit in the knowledge gained.

The examination each of the university students must pass before receiving credit for the course is even more severe than any Government test. As a result, not one student has failed or experienced the least difficulty in passing his license examinations.

To maintain a successful course in aviation requires instructors with thorough knowledge and experience in flying, plane design and construction, and building processes. It also requires

(*Continued on page* 214)

PERSONAIRLITIES

BY

by Caldwell

THE wistful little figure with its hands in its pockets that bears such a strong resemblance to Charlie Chaplin is Charles W. Meyers, now chief pilot and sales engineer with Great Lake Aircraft Corporation, Cleveland, Ohio, a charitable organization formed to relieve Glenn L. Martin of a building, a field, two blueprints, and a pair of pliers. When Glenn moved to Baltimore, the Great Lakes took over everything that was nailed down—the rest went to Baltimore.

Charlie told me some of his early history, but fortunately I have forgotten it. All I recall is that he used to fly gliders in the early days and ate practically nothing. Which is not to say that he was on a reducing diet by choice. He was reducing involuntarily, as it were, and clinging to the noble art of flying merely by his eyebrows, and to life itself by no larger margin that two doughnuts per day. It's hard to grow under conditions like that—in fact, Charlie found it impossible. He's still the same size as he was when he flew gliders. In fact, I think he has shrunk.

Before the war he was with Aeromarine and Standard, and was beginning to eat regularly; then he joined the R. F. C. as an instructor. After the war, barnstorming and building planes, racing at all the National Air Races, and for a long time with Waco at Troy. Now he is rounding off a lifetime of patient suffering by flying off the old Martin Field at Cleveland, which the visiting airman may readily identify by the tall smoke stack around which Charlie's great pal, Lady Mary Heath, deftly wrapped herself and a Great Lakes Trainer.

* * *

LIEUT. W. E. CLEVELAND, manager and chief pilot of Vermont Airways Corporation, operates from Canadian Gateway Airport, Derby, now Newport, Vermont. Anyone traveling by train to Montreal who finds that method of travel too irritatingly slow for one suffering from the aggravation of an intense thirst, may transfer at Newport to Cleveland's planes and be delivered at the Mount Royal Hotel in the shortest elapsed time. Many thirsting travelers, creeping northward and barward through the Great American Desert, owe their lives to W. E. Cleveland and his aerial aid to the perishing. But for him they would have perished by the wayside, at a way station, and been brushed off by the porter.

Walter E. Cleveland

Cleveland started flying in 1917, in the Army, and in 1921 began barnstorming an OX-5 Jenny throughout New England. Flew at fairs and did exhibitions with a wing-walker and parachute jumper, then graduated to a C6 Standard which, with two others, he operated from a base at Coventry, Vt., until 1926, when ill health forced him to give up flying for a time. In 1928 he was back in the game, organizing Vermont Airways Corporation to engage in commercial aviation and help Americans drink Canada Dry.

* * *

WE hear so much about the wonderful California weather that it is refreshing to read this from Pilot E. L. Remelin of the Boeing System: "It was nearly three years ago when I made my first midnight run north from Los Angeles for the Pacific Air Transport, which I helped to pioneer. The ceiling was what we call pea soup. I left for Bakersfield, pulled up through 3,000 feet of fog, and flew seventy-five miles on top before I got a break. Arriving over the town of Bakersfield, much to my surprise, there was no lighted field to be found. After some cruising around, I noticed someone waving a lantern, on what proved to be the flying field. To Fresno and points north I encountered the same conditions as between Los Angeles and Bakersfield.

"We now have lights every ten miles, and a lighted emergency field every thirty miles, and some good airplanes. The P. A. T. run is sometimes called one of the hardest runs in the country. It is very easy in clear weather—which we seldom have. The hard part of our run is the fog at Los Angeles, 8,000 to 9,000 feet to clear, then good flying until we reach San Francisco Bay region. More fog, and then good flying to Redding, 12,000 feet to clear before reaching Medford, Oregon, and then timber and rain to Seattle. On a round trip between Los Angeles and Seattle the take-offs and climbs will average 140,000 feet.

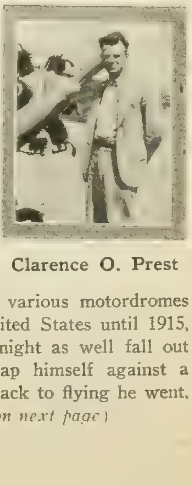
We do very little blind flying, and seldom over fifteen or twenty minutes at a time. But a great deal of the time we fly on top of the fog for 350 miles, and this fog is double overcast at times. In the winter we are bothered with ships iceing, not a pleasant condition. Sometimes our run for 600 miles is covered with fog; and when you get into this fog you are sure to ice. We overcome this condition by flying on top and landing at some high spots in the mountains near our regular stops. The mail is then driven by car to and from these fields to our regular stops. That's the bad side of our run. But don't take it all to heart, for we still have some mighty fine weather out here."

Yes, so I've heard. But where do you hide it?

Charlie Meyers of Great Lakes

* * *

CLARENCE O. PREST, who builds airplanes and motors at Arlington, California, started flying in 1911 and experimented with gliders and low-powered planes until 1913, by which time he had deteriorated to a point where he was willing to do motorcycle racing. That's about as far down the mental scale as a man is allowed to slide before the alienists are called in to look him over. However, he balanced himself around various motordromes scattered over the United States until 1915, when he decided he might as well fall out of an airplane as slap himself against a flock of boards. So back to flying he went.



Clarence O. Prest

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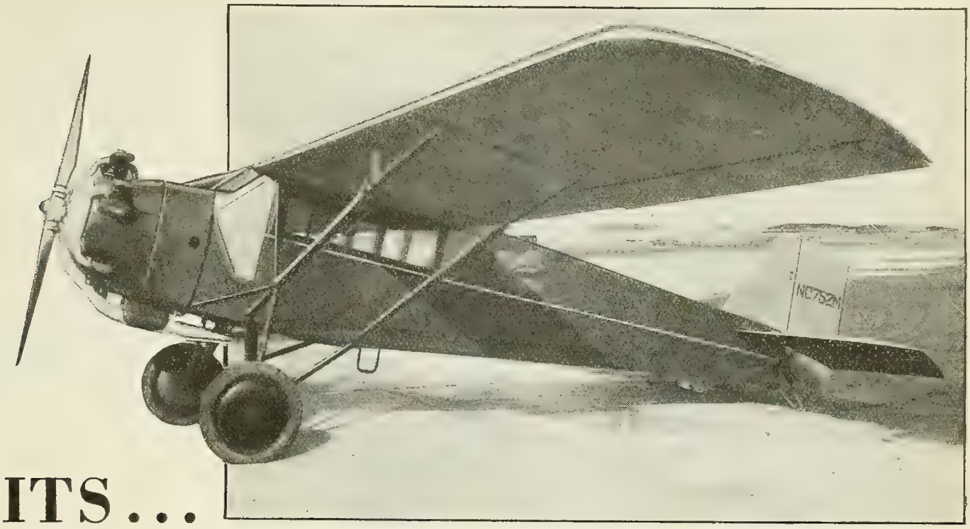
ECONOMY... *flys with the Robin*



PROFITS... *are yours when it lands*

$200, $175, $220, $190 . . . thus do the daily totals mount upward. The Curtiss Robin in flying taxi service is speeding profits as it speeds its passengers. For hustling citizens of modern, air-wise communities are demanding a ready-for-action, light charter service beyond the regular scheduled trips of air transport lines. They will pay for the time saved—and gladly!

Speed that makes friends, reliability that holds them—emergency service made usual in an age of swift action. Busy executives fly to an important conference . . . A famous engineer surveys from the air a distant water power project . . . A medical specialist rushes to a vital consultation . . . Even a bridegroom kidnapped by friends overtakes the honeymoon train.

Cross-country service is profitable, but a heavy, six or eight place plane flying one or two passengers is like using a sight-seeing bus for "around the block" fares! The Curtiss Robin transports pilot and two or three passengers swiftly—with outstanding economy. Its cabin is comfortable, seats are deep-cushioned, appointments are luxurious—the *aristocrat* of light cabin ships.

Always ready for action, the Robin takes off in a flash, spans distance with 85-120 mile speed, maneuvers with amazing ease, yet is steady in all circumstances of wind and weather. It is a clean-profit maker, for the Robin is Curtiss-Wright engineered, and upkeep is a matter of small concern.

Specific figures of operating cost of the Robin and data of earning power in light transport service are available for transport operators. We will gladly send these with specifications and performance details on request. Address Dept. R-70.

CURTISS-ROBERTSON AIRPLANE MFG. CO.
Division of CURTISS-WRIGHT
Sales Offices: 27 West 57th Street, New York

CURTISS ROBIN

For Business
Pleasure
Training

(PersonAIRlities continued)

purchasing a Bleriot with which he opened a flying school at Venice, Calif. It closed of its own free will, and he went to Riverside in 1916, where he built a four place OX-2 ship in which he made several unofficial altitude records. He also did day and night stunting with fireworks, but otherwise seemed all right. Then he worked for the movies in 1918—he doesn't say what he did, but I suppose he was the fellow who made the sand storms in the desert with an OX-5 and a prop. He had a slight mental lapse here, and built a biplane called "Poison," which did its best to live up to its name.

In 1919 he operated a field at Salt Lake, did more exhibition flying, and with Morton Bach built the "Polar Bear," a thick wing OX job. Completely unbalanced now, he flew that ship to Siberia, or toward Siberia, I should say; for at Prince Rupert, B. C., a storm providentially wrecked the thing one night, and he walked back. Then he built the Polar Bear II and flew it from Buffalo, N. Y., to Alaska in 1922. His luck still held, for between Eagle and Fairbanks he came down with spark plug trouble, and walked back again. By this time he was used to walking, and didn't mind. He reminds me of Shorty Cramer, all but the height. Shorty specializes in taking airplanes as far from civilization as possible and leaving them. It's funny the complexes we acquire.

Back to barnstorming went the long-distance Clarence until 1925, when he started building and selling airplanes again. Years ago he took a powerful OX Standard in one hand and a moving picture camera in the other and flew under the Suspension Bridge at Niagara Falls. In getting back up the Gorge the struggle between the powerful OX and the air currents became so involved that Clarence neglected to crank and thus lost some valuable film. And in 1915 he made three parachute drops from a gas bag at the Arizona State Fair. All this is very unsettling.

* * *

THE old flying author from the West Coast, Louis Goldsmith, sends me a picture of Herschel V. Laughlin, chief pilot for the Union Air Lines, Inc., of Portland, Oregon. He started life in 1895 and started flying in 1918 at Waco, Texas; went back to farming in 1919 with a reserve commission and a wife, both of which the farm refused to support. So back to flying went Herschel, and did barnstorming over the Northwest states until he knew every foot of the country.

Herschel V. Laughlin

"He knows them so well," complains Louis, "that I don't like to fly with him. Get five miles off the course, and he starts to fidget around in his seat. 'Ain'tcha gettin' a little west of your course?' he'll inquire. I shake my head and point to a steady compass. 'That's all right,' he says, 'but we just passed over old lady Watkin's chicken house. That's in the southeast corner of the northeast quarter of section so-and-so, and I remember in 1922 when I was flyin' through here—' Can you blame me for getting mad? In addition to his ability to line up old lady Watkin's chicken house with Si Robbin's apple orchard so as to fly a perfect course, he can also use a compass like the ancient mariner; and when he gets into the clouds or fog he sticks his head down in the office and makes darn good use of the little instrument that makes that whirring noise after the motors are stopped."

EARLY BIRDS

A MAN who should receive a medal for his work in the air is Major Albert Bond Lambert, who presented Listerine to a halitosian world. Things aerial were brighter and sweeter all round after Major Lambert got to work on them. Not even his best friend would tell him otherwise. Just think what he did! Men who had been unpopular at dances, whose partners would lean away from them, became eagerly sought after. One shot out of the Major's round bottle, and their partners would snuggle close to them, dreaming of new-mown hay. Dentists, who had been on the verge of giving up their profession to become chiropodists, became resigned to their work of boring in and hauling out, even liked it. And the newspapers blossomed out with those ads: "People used to steer clear of me—now they come up and lean on me, sniffing delightedly," and so forth, and so on.

Major Lambert's first connection with the air—I mean the uncontaminated outdoor air—was in 1903 when, as vice chairman, International Jury of Awards, he offered for that jury $150,000 in aviation prizes. Santos Dumont came over with his airship, but owing to a mishap he failed to take the air—or the $150,000; 1906 sees Major Lambert soaring aloft in balloons in Paris, France, with LeBlanc, winning his Balloon License No. 18 in 1908. In 1909 he and his St. Louis associates raised $5,000 for Glenn Curtiss to fly a half mile, which was pretty soft for Mr. Curtiss, now engaged in selling Florida real estate to Northern visitors. In 1909, as president of the Aero Club of St. Louis, Major Lambert organized the Kinloch meet, which paid a bonus of $26,000 for six Wright Model Box Kites to come to St. Louis, which I think they did by train! They had Brookins, Hoxey, Welch, Johnston, Turpin, Beachey, Parmelee, Ogilvie from England and LeBlanc with his Bleriot from France. In 1908 Major Lambert and H. E. Honeywell in the balloon *Yankee* flew from St. Louis to Tiger, Georgia, some 450 miles; and in 1910 the Major won his F.A.I. airplane license No. 61. His instructor was Brookins, and the plane a Wright B.

Major Lambert and Orville Wright

The first U. S. Aviation Reserve Corps was organized by Major Lambert, by permission of the Secretary of the Navy, in 1916. When the U. S. entered the war to boost the profits of the steel magnates and shipbuilders, Major Lambert organized the Missouri Aeronautical Society which equipped a complete balloon school with five balloons to start with, and offered the same to the War Department. The offer was accepted, and Mr. Lambert became Lieut. Lambert of the Aviation Section, Signal Corps, in command of the school which was transferred to San Antonio. Shortly after, he was appointed Major and served as instructor, training about 350 spherical balloon pilots. In 1919, after his discharge from the Army, Major Lambert organized the St. Louis Flying Club and located a field at Bridgeton, now Lambert-St. Louis Municipal Airport, where the 1923 International Air Races were held, and where the thousands of Robins you see roosting in hangars throughout the country were hatched and raised to maturity. The Major writes:

"Lindbergh came to me some time in January, 1927. At that time I knew him well and recognized his ability. He approached the subject of a transatlantic flight After a very brief conversation, I agreed to become one of his backers and I think my name was the first to be signed to a check for the purpose."

Thus casually does Major Lambert mention his part in an event that was to have more effect on aviation, because of its emotional appeal to the public, than any single achievement since the Wright brothers' first flight.

* * *

WILLIAM GRAY (BILL) SCHAUFFLER, JR., vice president and general manager, Interstate Airlines, Inc., C.A.M. 30, was born November 21, 1891, at Beirut, Syria, and missed the oriental rug business by an inch. He got to America with his father, who had been over there in charge of the medical department of the American Missionary College. He went to school in Connecticut, famous as the State that produced wooden nutmegs and Hi Bingham. Then he went to the University of Wisconsin, Forestry School, and received a forestry training that has been very useful to him on cross-country

(Continued on next page)

They're all "BORN FLYERS"

when they are trained in the MOTH

No lean, weary survivors of war-and-iron training—these new flying men and women. They are the present-day "born flyers"—with confidence, air-ease and "know-how" trained into them with the D. H. Gipsy Moth!

Noted instructors say that the Moth has dispelled all the old bugaboos of youth, age and sex. It "clicks" them all through with a certainty and thoroughness that builds school-reputation and attracts student applications as nothing else would.

Crocker Snow, well known Boston sportsman and operator, recently made this offer in the February issue of Sportsman magazine: "I will teach you to fly in one day. You can have your choice of instructors. You will have a Moth plane, the pick of the world's light airplanes . . . You will solo the airplane before the sun goes down!" This would have been a startling statement under some standards of training and equipment. But this instructor knows the soundness of his school's training methods, the ability of its instructors . . . and he knows the Moth!

The Moth has the trimness, lightness and maneuverability of a sport plane, but its rugged construction stands up under the continual hard knocks of training use. Ten million miles of flying in all parts of the world is the Moth's proud record. Small wonder it brings to common agreement the varying needs of a training ship!

Flying school officials experience a pleasing protection of profits in the Moth's remarkably low operating and maintenance cost. Instructors are enthusiastic about its abundant strength in acrobatic flying, its thorough cooperation in transmitting the pilot's skill to the novice. And students are amazed at its almost human qualities of patience and understanding, its easy correction of their inexperienced control.

Let us supply you with complete and specific details of Moth design and construction, performance and operating costs. If you desire, we will gladly arrange a demonstration so that you can fly the Moth and prove to your own satisfaction its excellent qualities for training. A card will receive immediate, interested, individual attention. Dept M—70

MOTH AIRCRAFT CORPORATION
Division of CURTISS-WRIGHT
Sales Offices: 27 West 57th Street, New York

D.H.Gipsy MOTH

(PersonAIRities continued)

flights. He can always pick out soft woods to land on. He worked as a newspaper reporter, in a cotton mill from day laborer to assistant superintendent, the U. S. Forestry Service in Tennessee, a sporting goods company in New York, and spent six years in Washington selling any real estate that wasn't cluttered up with statues of defunct generals and politicians.

It was in 1915, at San Diego, that Colonel Bill learned to fly under Myerhoffer; and later at Newport News, Va., where Walter Lees, Victor Carlstrom and Victor Vernon were teaching. He enlisted in the Army at Fortress Monroe, Va., in November, 1916, flew Army tests and was commissioned First Lieutenant, S.O.R.C., February, 1917, and after various duties in the U.S., went overseas with First Aero Squadron in August and landed in France September 3, 1917, as Adjutant and Flight Commander. On April 2, 1918, he made the first flight over the German lines ever made in a fully equipped and armed plane of the A.E.F., which is certainly a distinction, but only the first of many. He received the French Croix de Guerre with Corps Citation, three Silver Stars Citation on U.S. Victory Medal, Massachusetts Honor Medal, New Jersey Honor Medal, and was twice recommended for Distinguished Service Cross.

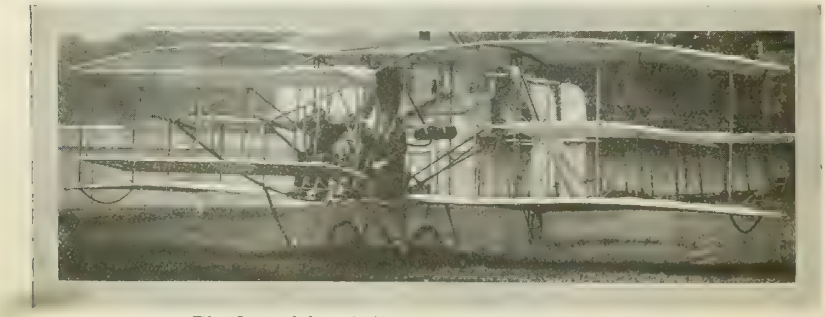
He commanded the 90th Aero Squadron from June to October, 1918, during the St. Mihiel and Meuse-Argonne offensives and was promoted to Captain and commanded the Third Corps Observation Group of three American and three French squadrons during the Meuse-Argonne drive, October to November 11, 1918. He was transferred to First Army Air Service Headquarters and served as Operations Officer, Assistant Chief of Staff and Chief of Staff, First Army Air Service, December to June, 1919, returning home in August to command Mexican Army Air Service Border Patrol until September, 1920 and other duties until he resigned in October, 1920, and was commissioned Major, Army Air Corps Reserve, in 1921 and Lieut.-Colonel in 1923.

It was he who brought charges against Rear Admiral W. R. Shoemaker, now retired, charging that an official report on the bombing of the *U. S. S. Virginia* in 1923 had been changed for fear that the news would ruin the Navy. During that trial he testified that during the St. Mihiel-Argonne show the 19th squadron had lost only one ship, although the planes had flown very low. General Houze took exception to the Colonel's statement about the altitude at which the planes had flown, declaring that all the time he had been in France and the commander of a combat division he had never seen a plane fly at that low altitude. It was then that Col. Schauffler made his historic statement when he told Houze that he must have spent all his time overseas deep down in his dugout! The news, played up by the newspaper correspondents, convulsed the nation. But what Houze thought of the reply was not printed. Which, I suspect, was just as well.

* * *

LIFE, as some noticing person remarked several thousand years ago, is a queer affair. Here I have before me a picture and biography of a man whom I have never met—and yet he was my brother-in-law some fifteen years ago. He is Charles R. Wittemann, whose brother Harold married my sister Doris when both were quite young and foolish. The marriage turned out to be just another of those things; in fact, the young folks lived together only two weeks, which was quite long enough to use up all the plates and first aid bandages in the house, when they separated. The affair gave me a good laugh at the time, and I should have profited by its obvious lesson; but of course I didn't.

Charles Wittemann started an experimental shop on Staten Island, which is to the city of New York what the South Pole is to the rest of the world. That was in 1906, when he was building gliders, on which he glided, glid, or glode until 1907 when he built his first power-driven plane—as power was reckoned in those days. It was 40 horsepower. This engine, probably an early Wright, urged through the air the contraption pictured herewith and actually carried three people, unless one or two of them stepped out after the picture was taken. This was in the days when airplanes were used very largely for photographic work, so one cannot be sure. In 1907 anyone who hadn't had his picture taken sitting in or leaning nonchalantly against an airplane was considered rather backward. This condition doubtless accounts for the numbers of people whom no one has ever heard of taking to the air, yet they will display pictures of themselves leaning against the early planes. In fact, more planes were damaged by people leaning against them than were wrecked by flying



The first triplane built by Charles Witteman, 1906 to 1907

About this early plane of Charles Wittemann's, odd as it looks to us today, comma, there is one feature, unused in other planes for years, comma, that now is beginning, twenty-two years after Wittemann invented it, to be standard practice in all airplanes. Period. I refer to the nifty tail-wheel, which swivelled. If Charles' idea of a tail-wheel, instead of a skid, had been adopted from the start, there would be more grass on the airports today, with the possible exception of Jack Berry's dust-bin at Cleveland, on which Jack can hardly raise an umbrella, let alone grass.

From 1908 to 1914 Charles and his brother Adolph occupied a larger shop on Staten Island in which they built many machines of Charles' design. These were flown by such pioneers at Capt. Baldwin, Lincoln Beachy, Bud Mars, Lee Hammond, Cecil Peoli, Harold Blakesley, and Ruth Law. In 1916 they moved to Newark and in 1919 to Teterboro, Hasbrouck Heights, New Jersey, where they built a plant that is now occupied by Fokker. Until 1922 they were engaged in building U. S. Post Office Department mail ships and a few machines for the Army and Navy. It is noteworthy that from the period 1906 to 1922 there was not one fatal accident in any of the planes that Wittemann manufactured. Since 1922 Wittemann has been engaged in aeronautical research.

F. E. Barlow in a Curtiss pusher

F. E. BARLOW, now in the automobile business in Rapid City, South Dakota, is an Early Bird who continues in the game in his spare time as instructor for Rapid Airlines School in that city. He does not, however, instruct in the ancient Curtiss in which he is pictured sitting, back in 1912, a year after he had learned to fly at North Island, San Diego, Calif., under Glenn Curtiss himself, who was the first Chief Instructor in flying.

Barlow flew for the old Curtiss Exhibition Company during 1912 and '13, covering the Middle West and Western states. In 1911 he held the school altitude record of 3,300 feet, and participated in the Dominguez Field (California) meet in 1912. Note from the picture that he is merely sitting in that thing to have his picture taken, and has no idea of going up at that moment. How do we know? Well, in addition to the propeller being stationary, the left wing is securely anchored to the ground by a very strong piece of rope.

KEYSTONE-LOENING AMPHIBIAN "AIR YACHT"

A PASSENGER A MINUTE

With winged power, a new day of transportation dawns on old San Francisco Bay. Three Keystone-Loening Amphibian Air Yachts herald its actuality! Six minutes now span the once tedious miles between San Francisco and Oakland, and preparations are complete for similar service to other hustling bay cities.

The original schedule of fifteen-minute sailings—"most frequent air ferry schedule in the world"—was found far too infrequent to supply opening traffic demands. The schedule was halved to seven minutes, and a total of 1630 passengers were transported the first three days of operation. On the third day, 384 passengers were carried in 384 flying minutes—a passenger a minute!

Substantial business men sponsor and direct the activities of Air Ferries, Ltd. They chose Keystone-Loening Amphibians as representative of their own sound business policies—swift, comfortable service with profitably low operating and maintenance costs. Their success is as much a matter of course as that of many other lines using these famous planes. Throughout the western hemisphere, from Alaska to Cape Horn, these sturdy boats of the air are clocking their schedules, earning substantial dividends. They are built for business!

We will gladly demonstrate to interested transport executives the ready adaptability and fitness of the Air Yacht for their requirements. Write Dept. K-70

6 to 8 passengers : 525 H. P. : 100 M. P. H. Cruising Speed

KEYSTONE AIRCRAFT CORPORATION

DIVISION OF **CURTISS-WRIGHT**

SALES OFFICES: 27 WEST 57TH STREET, NEW YORK

Joseph J. Tynan, Jr., President, Marshal Hale and Ted Huggins, Directors, of Air Ferries, Ltd., agree that their Loening Amphibians efficiently solve an important aerial transportation problem.

AIRPORT AND AIRWAY

News of airlines, airports, and airways; radio, lighting and other auxiliary services

By

Kent Sagendorph

Anxious Days for the Airlines

A CHANGE in public attitude has often resulted in serious losses to a great many long-established industries, and in most cases the victim cannot recognize the symptoms until long past the danger point. Great mills which formerly turned out thousands of useful articles per year have been forced to change their policies, manufacture different goods, hire expert forecasters of public acceptance and make their output conform to what the publice would buy. For the last few weeks there has been a noticeable change in the attitude of the newspapers and the public in general toward the air transport industry. Whatever the cause might be, the condition exists, and must be recognized by those who direct the passenger-carrying air lines of the nation.

The general attempt to make everyone "air-minded" is beginning to appear futile. In last month's issue of AERO DIGEST there was an excellent dissertation on this theme by a well-known aeronautical executive, Mr. George I. Stich, who has, apparently, had enough "air-mindedness" to last him for several years. As if his article were a signal, evidences began to appear on every side that other citizens were beginning to find the campaign not producing real results. Col. Paul Henderson, Will Rogers and General O'Ryan found space in various publications to urge a little discretion in the matter. That which started as a sort of slogan to urge everybody to interest himself in aviation has suddenly become obsolete and as ludicrously ineffective as Bryan's campaign motto about free silver.

In a way, this trend might prove of profound significance to transport lines. It indicates at least that most people in the country are not going to be induced by ballyhoo into accepting air travel as an established medium of transportation. As a matter of fact, it is no longer necessary to invent intricate publicity schemes to introduce air transport. The logical procedure today is to conduct the enterprise with as little stage play as possible; sane, conservative advertising replacing the glamorous photographs of bathing beauties and trained seals which formerly posed in front of yesterday's transport airplane.

Continuing with the same thought, the well-meaning friends of aviation who insist that air travel is safer than riding on a Pullman ought to be forcibly restrained. These tactics had advanced to a point where a well-known general magazine sent out a writer to investigate this alleged condition of safety, and he returned with an article which seemed to explode this theory with a loud bang and blow holes in all the vulnerable points in the air transport armor. He had facts, figures and signed statements which he claimed proved that travel on the Twentieth Century Limited was safer than on the airline, by a ratio of twenty to one. He interviewed ticket salesmen for airlines who told him that "without doubt air travel is the safest medium of motor transportation that exists today." In the next paragraph he exhibited an air travel accident report which, he claimed, concealed the true aspects of the case.

This is a regrettable attack on air travel in general, but he was in some respects correct. It is true that salesmen for airlines do sometimes exaggerate the safety element. When the writer referred to said that the public was not getting the true facts about air travel safety, however, he raised a debatable point. If he is correct in his assertion, the remedy lies entirely with the airlines. The men who sell tickets, answer questions, accompany passengers on trips and conduct the air traffic of the country should be very careful about general statements concerning safety. An article in a national magazine which attacks air travel with vehemency quoted above can do more harm to air traffic than a corps of publicity agents can rectify in a year. Conservatism should be the policy in all statements to the public which concern the operation, safety and efficiency of existing air transport lines.

Night view of the administration building at Phoenix Airport in Arizona

Progressive Texas

THE largest State in the Union, Texas, presents a thousand-mile frontier territory of cattle lands, oil producing centers, farms and thriving cities. Distances between centers of population and from end to end of the State are enormous. When aviation was young, Texas was the scene of great training schools which furnished primary and advanced pilots to the Army and some to Canada. In the post-war commercial era, remembering the example of war-time flights, the State has undertaken a campaign for airports at most of the smaller cities and for equipment to be placed along the thousands of miles of airway which lie within the Lone Star boundaries. A vast amount of new construction, improvements and expensive installation is being done, among which the following are noteworthy:

Tyler has well under way a large construction program, and will hold a formal dedication of an A1 airport in the early spring. While Tyler is not listed at the present time as a regular stopping place on the Delta Air Route, that city hopes to obtain this new stop shortly after the field is opened. The longest runway is 4,800 feet, or 200 feet longer than is required by the Department of Commerce to obtain an A1 rating.

Grand Saline, already a stop-over on the Delta line, is making improvements constantly to its field and hopes eventually to have a hangar to care for transient ships. A short time ago three trimotor transport ships, property of an oil company, were quartered at the field simultaneously, whereupon city officials began to see the need for proper storage facilities and have set the wheels in motion to obtain it.

On the route from east Texas into the central portion, improvements under way are, perhaps, the most noticeable of any in the State. At *Waco,* a recently designated stop on the Dallas-Houston line of Southern Air Transport, additional improvements are being made to the airport. Waco already has complete hangar facilities, equipped to take care of quite a large transient trade.

Fort Worth has new concrete aprons extending from the hangar into the field, where passengers may alight from planes with the maximum comfort even during rainy weather. There are five of these aprons, making possible the loading or unloading of five planes at a time. Expenditures totaled $18,000.00.

At *Beaumont* Municipal Airport a $15,000 hangar, a complete lighting system, drainage system, and weather bureau equipment are included in the town's construction projects.

San Angelo: The contract for a lean-to machine shop at the Municipal Airport has been awarded for $3,814.

(*Continued on next page*)

TRAVEL AIR SAVES TIME

for the world's largest makers of time-saving tools

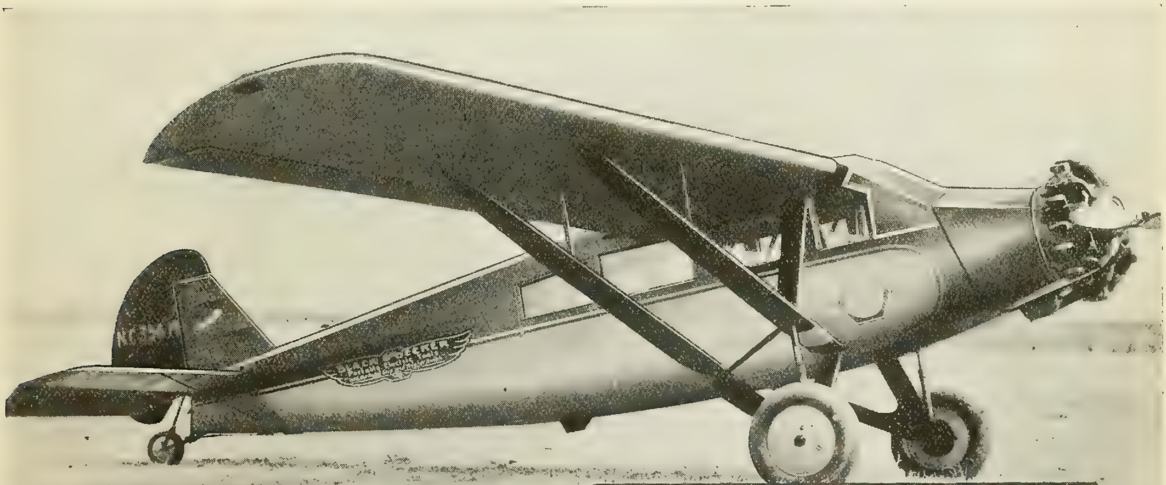
INDUSTRY sets a new pace. It was therefore a natural development that Black & Decker, the world's largest makers of portable electric tools, chose the Travel Air Six-place Cabin Monoplane to bring their extensive sales territories into closely supervised unity.

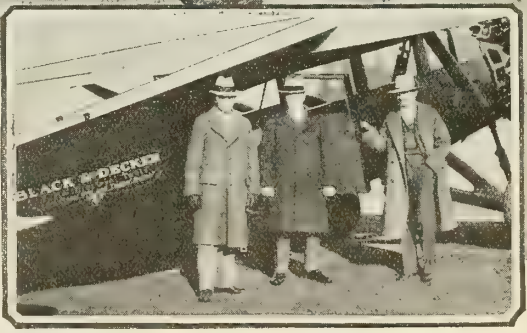
In January, the Black & Decker Travel Air was sent on a 38-day tour through eight southeastern states. District managers accompanied the salesman-pilot through each territory. Important sales and a new assurance of service were the result.

Time-saving! Golden words to great business organizations. Sturdy! Travel Air is designed and engineered by the world's oldest and largest airplane manufacturing organization. Reliable! Wind and weather hold no difficulties for Travel Air steadiness and supreme maneuverability. Fast! Wright-powered with 300 h. p. Whirlwind engine; speed up to 135 m. p. h. A 420 h. p. engine is available in a more luxurious model. Comfortable! The roomy, 6-chair cabin can be fitted with office furnishings to suit the purchaser. Service! A countrywide network of Curtiss-Wright bases assured prompt service to Travel Air users wherever they fly.

Low Operating Cost: Actual figures, surprisingly low, on operating cost will be gladly furnished to interested executives and concerns. Full details of Travel Air construction and performance can be had by addressing Dept. T-70

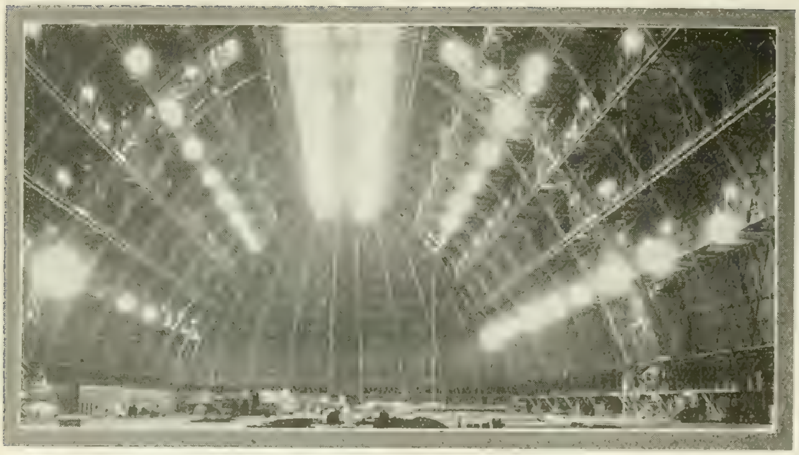
TRAVEL AIR COMPANY
Division of CURTISS-WRIGHT
Sales Offices: 27 West 57th Street, New York





The Travel Air Cabin Monoplane of Black & Decker Mfg. Co. is regularly used by its air-minded officials. Here are Vice-President A. G. Decker and President S. D. Black setting out on one of their many time-saving flights with W. L. Snowden, Salesman-Pilot.

A PLANE FOR EVERY PURPOSE TRAVEL AIR



Interior of the immense Goodyear-Zeppelin hangar at Akron where the rigid airship ZRS-4 is being built for the United States Navy

(*Continued form preceding page*)

A new airport will be established at *Stillwater* and one or two steel hangars, a machine shop equipped for motor repairing and runways will be constructed.

At the *Brownsville* airport Pan American Airways will build a new brick and steel hangar with concrete foundation.

The *Big Spring,* Texas, airport will soon be equipped with complete radio broadcasting and receiving equipment. The field is electrically lighted with border, obstruction, beacon and floodlights adequate for night flying. The Big Spring landing field contains 230 acres of land slightly sloping and well drained, located two miles from the city. It is equipped with three steel hangars and a five-room administration building with telegraph, telephone and restaurant accommodations.

Sweetwater has completed a large dining room and restaurant for the convenience of occupants of transient ships which pass over this way about noon. The service has already been demonstrated as a convenience to air travelers and a profitable enterprise to the airport.

At *Pecos* a new landing field has been constructed within the last few months. Though not in the direct lines of air travel, it has been designated as an emergency field between the eastern half of the State and El Paso. Situated in the heart of the oil region, Pecos is one of those boom towns right out of a Frank Norris novel. Its present population is about 3,500 and all the buildings are glaringly new. The city has, however, several wealthy citizens who take pride in its aviation development.

At *Midland* the airport is a regular stop on the Dallas-El Paso route of Southern Air Transport. A new administration building is to be erected, affording accommodations for transient pilots and passengers, as well as executive offices.

Del Rio has purchased 126 acres at a sum of $6,800 for its municipal airport.

Abilene has just completed a new concrete hangar and a new lighting system at Kinsolving Airport. The terminal building will be ready for occupancy soon, and a $9,000 filling station is in the process of erection.

Bonham: L. K. Crawford, mayor, has let the contract for a new 60 by 80-foot hangar at the municipal airport.

Mineral Wells: A committee of citizens has organized a holding company for the purpose of purchasing 100 acres of land and establishing an airport which will earn the approval of the Department of Commerce.

Stinton: A new approved emergency field has been added east of the city, which will boast a 2,000,000-candlepower beacon within a short time.

McAllen: A 200-acre tract of land south of the town has been selected as the new McMullen Municipal Airport site and will be purchased at a cost of $35,000.

Pharr: A south Texas community has added its name to the rapidly growing list of airports and landing fields. The Kiwanis Club there is credited with closing a deal for the land which will be used for the port, located a mile south of the city.

In addition to these communities, *Dallas,* one of the country's greatest aviation centers, has been making radical changes in its airport program. At *Love Field* two new hangars and an expensive administration building are nearing completion and will be ready for occupancy soon. One steel hangar is being erected by the Airports Utilities Corporation at a cost of $100,000; another is under construction by Good and Foster at a cost of $80,000.

At *Hensley Field,* Dallas, a new clubhouse is under construction for the officers of the 366th Observation Squadron, Air Corps Reserve. The Government has a lease on the field, and formal authority has been received to remove a $75,000 steel hangar now at Little Rock, Ark., and transfer it to Hensley Field.

Noyes Field, the new Curtiss-Wright airport west of Dallas, has just completed a new hangar and administration building costing $100,000. Curtiss-Wright is operating a school there, under the direction of Captain Long.

AIRPORT AND AIRWAY DEVELOPMENT

Omaha's Airport Difficulties

THE most sincere sympathy of this department goes to the citizens of Omaha, who are suffering from the effects of a chaotic airport construction program. It must be a source of deep annoyance to them to see their taxes, appropriated to build a modern and efficient airport, expended in delays, arguments, red tape and useless gestures. From a number of different sources information has reached us that the original plans for the construction of this project has gone completely awry, and that some of the original backers of the venture are calling loudly for the complete surrender of all hope and a fresh start at some other locality.

A year ago, the citizens voted $250,000 for an airport. This was to be disbursed at the rate of $50,000 annually for five years. Last year the airport commission used up its $50,000 appropriation and also $30,000 from the 1930 fund. This last amount was subscribed by a committee of citizens and was given to the commission with the understanding that when this year's funds became available the amount would be repaid. Later developments point to grave doubts as to whether the city will recognize this claim, because work has been suspended, delay follows delay, and the appropriated funds have accomplished very little.

The cause of most of the difficulty is a row of cottonwood trees bordering the proposed development. The proposed airport is being, or was being, constructed at a point called Cornish Park, which was deeded to the city some time ago. The deed of gift contained a clause specifying that the trees were never to be cut, and the Park Commissioner stolidly refuses to do so. But the airport cannot safely be used for flying operations while they remain. Boeing Air Transport refuses to use the field, and private operators will not land there.

Consequently, there is one faction which holds that the city would lose its title to the land if the trees were removed, another group which cannot see why the city insists upon building an airport at this particular point, anyway, and a third party composed of the chamber of commerce and civil leaders who daily exhort the public to action, point to the financial loss already inflicted, exclaim over Omaha's delay in the matter and urge that the whole thing be dropped and a good airport be constructed at some other place.

Council Bluffs, Iowa, Omaha's neighbor across the Missouri River, took a lesson from the futile gestures of its larger associate. While Omaha's population has been trying to force some action from its Park Commissioner, Council Bluffs has secured options, sold bonds, purchased land, let contracts and proceeded with the construction of a thoroughly serviceable airport, which should be ready for use this year.

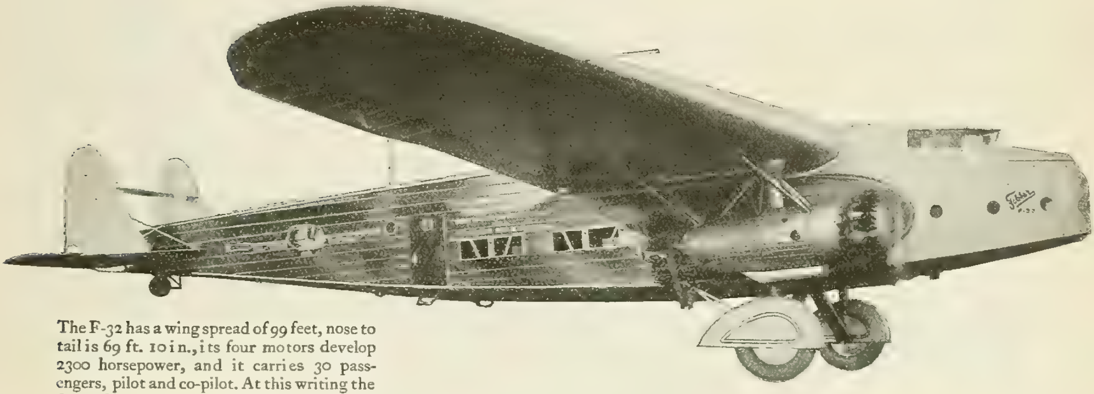
Omaha must watch a large share of its airport and airway activity transferred across the "muddy Mizzou." As most of its citibens know, Boeing is the largest carrier of air mail in the country, and some time this summer will inaugurate operations on one of the most important passenger air routes in the world. Omaha was to be a stopover on that line. In addition, the volume of purely local commercial aviation is high enough, in that region, to enable an airport to pay for itself within a few years.

Congratulations to Pontiac Airport

THE first official airport rating issued by the Department of Commerce, under the Airport Rating Regulations of the Air Commerce Act of 1926, was bestowed recently upon the Pontiac Municipal Airport, Pontiac, Michigan. In addition to receiving the first rating, Pontiac received the highest type: A1A.

(*Continued on next page*)

First of a fleet of Fokker-32's for Western Air Express



The F-32 has a wing spread of 99 feet, nose to tail is 69 ft. 10 in., its four motors develop 2300 horsepower, and it carries 30 passengers, pilot and co-pilot. At this writing the fleet of F-32's is well under construction.

finished throughout with Murphy Aircraft Finishes

THE Fokker Aircraft Corporation of America in building its fleet of F-32's has flatly specified Murphy Aircraft Finishes throughout.

We are proud of this association with ships so fine and of all that this association implies.

Those concerned with the technicalities of airplane finishing will be interested to know that Murphy Aircraft Flexible Finishing Lacquer Clear was used on the wings which are entirely of ply-wood covering. This famous finish has the unparalleled ability to withstand the destructive ultra-violet rays of the sun and to "flex" with the expansion and contraction of the wood.

The Fokker Aircraft Corporation in selecting the finishes for its super-ships, was concerned not only with the durability and beauty of the wings but also wished to ensure the most lasting beauty to the finish of the fabric-covered fuselage.

Murphy Finishes in all branches of industry have been famous for over 65 years as being without peer. In the field of aviation, as well, those who are satisfied with nothing less than the finest are specifying "Murphy".

We shall be glad to send our "Specification Manual for Aircraft" to those interested.

MURPHY VARNISH COMPANY
Newark Chicago San Francisco

MURPHY AIRCRAFT FINISHES

Aircraft Spraying Lacquer Colored
Aircraft Super Spar Varnish
"Z-1" Dural Primer Enamel
Heat Resisting Aluminum Mixing
Aircraft Flexible Finishing Lacquer Clear
Aircraft Non-Toxic Nitrate Dope

(*Continued from preceding page*)

This code symbol refers to the equipment and facilities offered. The first letter "A" means that certain minimum standards regarding hangar space, general arrangement and equipment have been complied with. The numeral "1" refers to the size of the landing area, and the last letter "A" has to do with the night lighting facilities.

By means of this uniform rating, pilots can tell by a glance at a roof sign or a map approximately what sort of an airport awaits them below. As more and more airports are rated and given these designations, the symbols will appear next to the directional arrow on roof signs and on strip maps, charts and guides. If the pilot is forced to make a night landing, for instance, he might be enabled to continue on past a poorly-lighted field with the knowledge that a powerful battery of floodlights awaited him a few miles farther on.

Fire Destroys Battle Creek Hangar

TWO planes, a Stinson-Detroiter and a Swallow biplane, together with a rebuilt hangar, were destroyed by fire at Kellogg Airport, Battle Creek, Michigan, recently, resulting in a loss of $30,000. In addition, records and effects which had been accumulated during eighteen years of flying by Pilot E. A. Goff, Jr., were consumed in the blaze.

Overheating of a furnace resulted in sparks setting fire to the roof. One Harold Herrick, a young pilot who was alone in the structure, risked his life in an attempt to wheel the Stinson outside, but before he could push the heavy doors open, a blazing section of the roof fell upon the monoplane, exploding fifty gallons of gasoline in the wing tanks. The hangar had been rebuilt last year at considerable expense.

Stout Takes Austin Hangar at Cleveland

STOUT AIR LINES will take over and operate the large Austin cantilever hangar at Cleveland Airport, described at length in these pages in a recent issue. The hangar, one of the largest in the country, will be used by the Stout Air Lines as its Cleveland base for transport operations, and as a service department for repair and maintenance. Also, the Stout offices will be moved at once from their present location in downtown Cleveland to the newly-acquired property.

The hangar is 120 feet wide, with a 200-foot clear-opening door along its entire length. Planes twenty feet high with a wing spread of 190 feet may be admitted, although there are no such monsters in the country at the present time. The door opens outward and upward in sections, operated by motors. A flash beacon is installed on the roof.

Pittsburgh Airport Construction Delayed

DIFFICULTIES with landowners may cause the county-city airport near Pittsburgh, Pa., to be delayed for a considerable period, according to advices received from the Smoky City. The commission had agreed to pay the owners $300 an acre for their land, but one of them, who thought his property was worth more, brought suit. A test case resulted in a defeat for the county, which was again defeated on appeal.

County Commissioner McGovern stated that this test case was extremely unfortunate. All the other property owners profited by it, and the general level of payment will be more nearly $500 an acre than the original $300. More money will have to be appropriated, and a considerable period must elapse before it becomes available.

Regulations at Port Columbus

THE City of Columbus, Ohio, has sent this department a neatly-printed booklet which is described as the Rules and Regulations in force at Port Columbus, together with a schedule of rates, charges, and so forth. The whole subject of rates at this airport was discussed and its prices were given in the Airport and Airway Section for January. But there are quite a good many additional regulations given in the booklet of which no mention was made.

An examination of the various charges shows that the information we published in January was correct, and that the charge of $40 a day to operate your own seven or eight-passenger sightseeing plane is duly authenticated. Also, the charges for locker rental, tool box rental, bunk rental and various other rentals is fixed. Floodlights, boundary and other lights will be turned on by payment of two dollars and a half per hour or fraction thereof, and eight by sixteen feet of desk space costs twenty-five dollars a month. If a patron turns on the light in the municipal hangar he is assessed twenty-five cents per hour. The booklet may be procured by addressing Mr. William F. Centner, Superintendent, Port Columbus.

Two Bulletins Published by Department

OF interest to airport managers, city officials and others who are required to direct airport operations, are two new publications of the Department of Commerce. They are: "Airport Management" and "Suggested City or County Ordinance and Uniform Field Rules for Airports."

Both bulletins represent the Department's efforts to standardize airport rules as to operation and control. Types of management now in effect are analyzed and discussed in the former publication. In the latter, the Department has printed in full a splendid ordinance for municipalities and counties which propose to establish their own airport. By conforming to its provisions, a certain uniformity will result, affording a country-wide unity in airport procedure and doing away with the present confusion. These bulletins may be had by addressing Col. Harry H. Blee, Airports Section, Aeronautics Branch, Department of Commerce.

Red Bank Airport Announces Dividend

LAST month a statement was made in this department to the effect that Fairfax Airport, Kansas City, had announced a dividend. This peculiar phenomenon was partly the result of the rich deposit of natural gas which lies beneath the airport's broad runways, and which is being exploited commercially. At Fairfax the revenue does not come entirely from airport operations.

At this time, however, we take pleasure in announcing that the Red Bank Airport, Redbank, N. J., owned and operated by the Airview Flying Service, has announced a dividend based exclusively on flying operations. The annual report of the corporation for 1929 shows net earnings of $9,711.16. Officers and directors include Valentine Van Keuren, John F. Casey, Edwin Stuart, III, and William Barclay Harding.

Curtiss-Wright Offers Auto Livery

IN the near future, all airports in the Curtiss-Wright chain may see small cars dart to and fro, salesmen alight therefrom, climb into waiting airplanes. An agreement has been reached between the Curtiss-Wright Flying Service and the Hertz Drive-It-Yourself System whereby all the numerous supply stations and schools at the various airports will provide two or three cars for the use of pilot-salesmen who fly in from another city, dash into town for three or four calls, return to the airport and fly on to the next stop. The rates are said to be low, and the scheme offers good possibilities for all firms who have men on the road as salesmen, auditors or supervisors.

Joliet Ill. Lets Construction Contract

THE firm of Youngsberg, Brown & Youngsberg, airport engineers, has been awarded the contract for construction supervision at the new Joliet (Ill.) Park District Airport. The sum of $300,000 will be expended in the work, which includes grading, draining, erection of administration and hangar buildings and a complete night lighting system. The site is four and a half miles west of Joliet on Highway No. 69, and is a point on the Government lighted air mail route to St. Louis.

(*Continued on next page*)

American Legion air-marker, 379 feet long with letters 50 feet high, Pasadena, Calif.

A SPECTACULAR SUCCESS

TEXACO MARFAK GREASE has proved a spectacular success in the field of aviation. It has finally solved the problem of effective lubrication for enclosed rocker arm and valve assemblies, and is equally the ideal lubricant for grease packed magneto bearings and other enclosed parts. ▲ ▲ Prominent pilots who have tried Texaco Marfak Grease on record-breaking flights testify to its unparalleled lasting qualities and resistance to high temperatures. While comparatively new to aviation, its effective work under many other important and difficult lubricating conditions is a long established fact. ▲ ▲ Texaco Marfak Grease—and Texaco Airplane Oil and Aviation Gasoline—are available at most of the important airports of the country. These well-known products offer the highest type of dependable service. Write for the December, 1929, issue of "Lubrication"—devoted entirely to Aircraft Engine Operation.

TEXACO LUBRICANTS

THE TEXAS COMPANY
17 Battery Place, New York City

(Continued form preceding page)

N. A. T. Tests Curtiss Carrier Pigeon

SEVERAL new models of the Curtiss Carrier Pigeon II, the new air mail ship developed by the Curtiss Aeroplane & Motor Corp., are undergoing tests on the eastern division of National Air Transport, Inc., according to Mr. E. P. Lott, operations manager. It has been found to perform well with heavy loads, carrying from 1,800 to 2,000 pounds of air mail and express at a cruising speed of 122 miles per hour, and a high speed of 149 miles per hour. A geared, water-cooled, 625-horsepower Conquerer engine actuates, through a two-to-one reduction gear, a three-bladed metal propeller. Increased engine efficiency and slower propeller speeds are said to result.

THE PASSENGER LINES

Fare Cuts Bring Business, But—

THOSE airlines which participated in the general rate reduction between December 15th and January 15th are now reaping the rewards of their farsighted policy. Business is absolutely phenomenal. Instances could be given of more than a dozen lines and branches which have been, and now are, operating every flying vehicle available, and still turning away passengers. There can be no doubt that this peak traffic really exists. The story behind the capacity crowds and the prosperous atmosphere, however, is a little different.

When a group of air transport men meet and talk over their common problems, an observer can see that there must be a depressing note somewhere in the background. Those present cannot deceive themselves about the economic significance of a fare reduction, and generally admit that all of them are losing money on passenger routes, in spite of the large volume of traffic. The means they propose to employ to get themselves out of red ink are numerous, and in general, practical. Some plan to discontinue all ground services, lunches, bus transportation, and carry as many capacity loads as possible, in the hope that as planes become more efficient this deficit will disappear. Others do not favor this scheme, preferring to carry passengers at a loss until the idea of frequent air travel is firmly implanted in the average citizen's mind, when a gradual readjustment of rates will take place.

It is a matter of time and a matter of opinion, how long the present low rates will remain in force. Western Air Express claims that rates on its lines will never go to the high level which marked the lines' inauguration. In a statement to this effect, Western Air Express officials report as follows:

"When the San Francisco line was started the fare was $55, then $33, now $21.50. To Kansas City it was $175, then $140, now $120. The excursion rates were continued on January 15th for a period of not less than sixty days. If, at the end of that time, the volume of business warrants, they will be maintained at or near this level. They never will be raised as high as the original tariffs."

With its usual reticence this company does not choose to talk about the percentage of increased traffic since the above-mentioned reductions, but it is said that Aviation Corporation lines showed a 400 per cent. increase immediately and a general average of 200 per cent. ever since. Southwest Air Fast Express, headed by Mr. Halliburton, has borne the heaviest share of the traffic increase burden, but its fares are so low, approximately bus fare in many cases, that it is doubtful whether any financial advantage has been obtained.

High-speed Consolidated Fleetster used in the NYRBA mail service to South America

The American Air Transport Association undertook a survey of this condition recently which revealed that the general percentage of traffic increase on twenty-seven air lines now operating in the U. S. was, and continues to be, over 200 per cent.

Start of Scheduled Trips on the NYRBA Line to South America

FROM Santiago, Chile, on February 18th, a Ford tri-motored monoplane carrying the first consignment of northbound air mail over the lines of the New York, Rio and Buenos Aires Line departed on the first leg of the 8,000-mile trip. At Buenos Aires the mail was loaded into Consolidated Commodores, Lockheed Air Express monoplanes and all-metal Fleetsters for the seven-day trip to Miami, where Eastern Air Transport, Inc., completed the American end of the service.

There are three main divisions of the line's operation. For the present the company will begin its run at Miami, where the flying boats carry mail and express across the Caribbean and through the West Indies to Paramaribo, on the east coast of South America. The second division is from this point to Rio de Janeiro, Brazil, whence the third lap transports the cargo to Buenos Aires. Here the company's landplanes connect with their long-established trans-Andean service to Santiago, which city is reached after several hours' flight at extreme altitudes, often as high as 20,000 feet.

On each of the three over-water divisions from Miami to Buenos Aires, three classes of service are to be maintained. Fleetsters and Lockheeds operate through service for fast mail and express schedules, maintaining an average of 146 miles per hour. Consolidated Commodore 20-passenger seaplanes will carry both passengers and mail on through schedules between division points. In addition, a fleet of nine Sikorsky amphibions is maintained to care for local mail and passenger traffic between division points, with stops at important centers of population.

The establishment of the present mail service is a prelude to scheduled passenger operations, which will be inaugurated later in the year. The line opens a vast commercial, industrial and political territory to closer relationship with the United States, and reduces the time necessary for mail deliveries from fifteen days to seven, thus providing keen competition with the subsidized German and French airlines now operating on the South American continent. Until the establishment of the NYRBA Line it was much easier for Brazil and Argentine business men to communicate orders and receive small shipments from Europe than from the United States; the distance from New York to Buenos Aires being approximately the same as that from New York to Bombay, India. With the advent of seven-day air mail service, however, an added impetus to American trade in South America is expected.

San Francisco Air Ferry Starts

VERN GORST'S Puget Sound ferry was such a success that he and an associate have started operations on the second, from San Francisco to Oakland. It is called the world's shortest airline—running time six minutes, and a service schedule of a plane every fifteen minutes. Three Keystone-Loening Air Yachts were delivered to start the service, but fifteen more were ordered at once for immediate delivery. With a fare of $1.50, the tedious ferry and street car trip from Oakland to San Francisco on the stormy bosom of the bay should be quickly rendered obsolete.

Stout Adds Two Dornier Flying Boats

OPERATION of two Dornier Super-Wal flying boats over a route from Detroit to Cleveland and Buffalo, as soon as navigation opens on the lakes, was announced by Glenn H. Hoppin, general manager of the Stout-D. & C. Air Lines.

The boats will be on a daily schedule. They are predecessors in design to the great Dornier Do.X. which carried 169 passengers on a trial trip in Germany, and were brought from Friedrichshafen, Germany, and placed in storage in the Philadelphia Navy Yard. They are equipped with four 500-horsepower Hornet engines and are capable of a speed of 126 miles per hour.

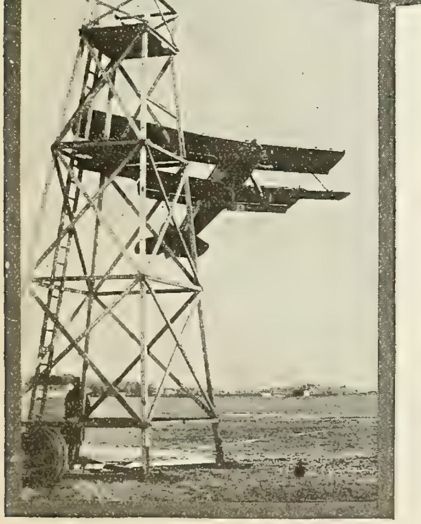
(Continued on next page)

Proved *Safety* Plane

Curtiss "Tanager" Awarded $100,000 First Prize in Guggenheim Safe Aircraft Competition

●

Curtiss "Tanager" Plane which won $100,000 first prize in Guggenheim Safe Aircraft Competition, proves a noteworthy stimulus to more secure flying.



THE Guggenheim Fund, in awarding the Curtiss "Tanager" Plane $100,000 first prize in Safe Aircraft Competition, provides a noteworthy stimulus for the development of safer flying, creating at the same time a public realization of the rapid progress already made, the objectives now attained.

Demonstrating its ability to execute forced landings, the "Tanager" flew at a minimum speed of 35 m.p.h., glided at less than 38 m. p. h., came to a dead stop in less than 100 ft. after landing, and repeatedly landed and took off from a field only 500 feet square, surrounded by obstructions.

Throughout every test, where performance alone counted, and where skillful maneuvering was at a premium, Goodrich Silvertowns were tire equipment for the "Tanager."

Repeatedly the record-breaking planes use Goodrich. World records have proved them . . . Silvertowns flew with Lindbergh, with Goebel, Brock and Schlee, Kingsford-Smith, Hawkes.

The B. F. Goodrich Rubber Company, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ont.

Goodrich *Rubber for Airplanes*

. . . another B. F. Goodrich Product

32,000 Different Rubber Articles • Goodrich Silvertowns • Zippers • Rubber Footwear
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(Continued from preceding page)

Mexico-Los Angeles Traffic Grows

THE increase in traffic on American airlines seems to be reflected in the Pickwick Latin-America service, which reports a total of 221 passengers carried on the line during the month of January. Its ships, eleven Ryans and one Fairchild, flew a total of 334,994 miles during the five months from August 1st to December 31st, the report shows.

Colonial Adds Morning Plane

AN early morning run has been added to the service now being offered by Colonial Air Transport between New York and Boston. The company, which has been running two trips per day in both directions, has lately inaugurated a third, which leaves both downtown terminals at 8:15 a. m., transporting the passenger to the airports by bus; flying to the end of the line, another bus trip and the passenger is deposited at the terminal by 10:45 a. m. The existing schedules will remain substantially the same.

Lincoln-Omaha-Wichita Passenger Service Inaugurated

AIR passenger service between Lincoln and Omaha and Lincoln and Wichita was inaugurated last month by the Brower Air Service, which had been operating between Omaha and Wichita since last fall. Stops are made at Salina and Belleville, Kansas, as well as at the terminals, and the planes are using the Lincoln Municipal Airport. Curtiss Robins are used on these lines.

S. A. F. E. Adds West Coast Hook-Up

WITHIN the very near future Southwest Air Fast Express will add another route to its extensive operations, in the form of a line from Kansas City to Sweetwater, Texas, with a transfer at Tulsa. At Sweetwater the passenger boards a train for an overnight trip, taking a Standard Airline plane at El Paso the next morning. Thus S. A. F. E. lines may sell tickets for a trip straight through to the coast. Beacons and other night-flying equipment are being installed on the line.

AIR MAIL NOTES

Hoover Asks Appropriation for Air Mail Extension

A SUPPLEMENTAL estimate of $1,500,000 to increase the appropriation for foreign air mail carrying was submitted to Congress last month by President Hoover. The additional sum is to be used for augmenting the number of trips on the routes of the Pan American and NYRBA lines between Cristobal to Santiago, Chile, thence to Buenos Aires and from this point to Montevideo, Uruguay. It will also provide three trips weekly from Brownsville, Texas, to San Lorenzo, and establish new routes from St. Paul and Minneapolis to Winnipeg.

NYRBA Awarded Haiti Contract

A CONTRACT similar to the ones granted the New York, Rio and Buenos Aires Line by the governments of Argentina, Brazil, Chile, Uruguay and Venezuela was recently awarded that company by the government of Haiti. It provides that the company shall receive the first twenty-five per cent of all international air mail originating in Haiti before any is allotted to its competitors, and covers a period of ten years. The Haitian government, in return, will establish airports, supply beacons and meteorological services.

January Poundage Shows Decrease

DUE, in all probability, to the post-holiday slump, the volume of air mail carried by the airlines during the month of January showed a decrease below that of December. The figures are: December, 618,809 pounds; January, 505,993 pounds. The general slump in pounds carried was somewhat relieved by announcements from the Thompson Aeronautical Corporation, carriers of air mail in Michigan and Ohio, that its lines carried 165 per cent. more mail in January than in the month previous. On the Chicago-St. Louis, Cleveland-Louisville and Atlanta-New Orleans lines slight gains were reported.

Albany-Cleveland Six Hour Service

A NEW night air line making possible six-hour service between Albany and Cleveland was announced by the Colonial Division of the newly-formed American Airways, Inc., affiliated with the Aviation Corporation.

New beacons on the line have aided in putting forward the inauguration of the service, originally scheduled for later in the year. Planes may now carry night mail out of Albany for the first time, and a substantial gain in the amount of poundage is expected.

Pan American Airways Mail Line Opened to Passengers

A MAIL line between Cristobal, Republic of Panama, and Arica, Chile, operated by Pan American-Grace Airways, Inc., announced that henceforth passengers will be carried throughout the entire 2,500-mile route. The line connects at Panama with planes of the Pan American line from Brownsville and Miami. Rates on the line were not made public.

NEW COMPANIES AND MERGERS

Notes on American Airways Inc.

BY turning over its transport, mail and express lines to a new subsidiary called the American Airways, Inc., the Aviation Corporation hopes to simplify its internal organization and unite all transport activities under one head. The president of the newly-formed company, Mr. James F. Hamilton, long schooled in meeting transportation problems, one-time railroad executive, stated that the first step would be to rearrange certain schedules so that through passenger service would be available between Cleveland and the Southwest. A new link will be added, however, between St. Louis and Tulsa, making two main lines available between Chicago and Tulsa; one via Kansas City and the other by way of St. Louis.

Other than this no plans were revealed. It is rumored, however, that the corporation plans to spare no expense or pains in the matter of expanding transport facilities that the formation of this subsidiary clears the way for numerous refinements in operating methods, as well as lessened administration and overhead expense. The present operating lines are to drop their individuality and become "divisions;" thus, from this time they will be known as the "Colonial Division," "Universal Division," "Southern Air Transport Division," and so forth. In this way the central control over all lines will accelerate revisions in schedules and coöperative action between the various carriers.

The Aviation Corporation has been perhaps the last of the four big groups in the industry to resist the current trend toward fare reduction. After S. A. F. E., Pickwick, T. A. T.-Maddux and others had announced reductions, the New York-Boston fare over the Colonial line was still thirty-six dollars. Universal compromised with a scrip-book system and Interstate Air Lines stopped carrying passengers altogether. Gradually, as competition became keen, lower fares were necessary and were announced. One of the chief difficulties has always been the cumbersome red tape and the ponderous organization of the Aviation Corporation, which has been merely a federation between individual operating companies. Now, however, with a strong central command, the American Airways, Inc., can control all the units of the group easily, quickly and effectively.

W. A. E. Takes Over Aero Corporation of California

LONG the foremost independent air transport organization, Western Air Express has continued its policy of consolidating its position, strengthening its resources and stretching out farther and farther over the Pacific Coast and the Southwest. West Coast Air Transport came under the W. A. E. banner quite a while ago; Mid-Continent Air Express followed with sturdy patronage in the Middle West out of Kansas City, and last week came announcement that another 1,600 miles of daily flight had been added to the grand total, making a huge transportation system stretching over ten states and representing 12,000 miles of flying each day.

The Aero Corporation of California was a holding company with various subsidiaries. One was Standard Airlines, Inc., operating a dozen Fokker trimotors from Los Angeles to El Paso. Another was the Fokkar distributionship and dealership. Still another was one of the finest pilot training schools in the country, which had turned out 1,500 pilots in seven years and won the highest rating from the Department of Commerce.

Jack Frye, president of Aero Corporation, becomes a director in Western Air Express.

Holmes Airport Changes Name

HOLMES AIRPORT, on Long Island, in the vicinity of Jamaica, has announced a change in name. It is to be known henceforth as Grand Central Air Terminal. No changes in policy are contemplated.

(Continued on next page)

THE WRIGHT-GIPSY IS NOW IN FULL PRODUCTION!

THE first automobiles rolled out of the few richest homes in the land. But small dependable motors and mass production sent costs tumbling to where the many could operate cars of their own.

The announcement of the 90 horsepower Wright-Gipsy is, then, an event important to Aviation and to America! For this light, compact and thoroughly tested engine opens new horizons as to who can own and fly an airplane.

The Wright-Gipsy is not a new engine. It is the American model of the famous British de Havilland motor. In Europe, in Asia, in Africa, record after record, success after success, has been marked to the credit of this marvellous light power plant.

It has covered millions of miles . . . it has proven itself safe and easy to fly . . . it is, among motors of its class, a champion already crowned! Built now under Wright precision methods, it has exceeded all government requirements, with plenty to spare.

Pilots of light sport and training planes will find in the Wright-Gipsy, plenty of dependable power, economical cost of operation, and an extreme simplicity of design that makes service costs negligible.

WRIGHT AIRCRAFT ENGINES

WRIGHT

AERONAUTICAL CORPORATION
PATERSON, NEW JERSEY
A DIVISION OF CURTISS-WRIGHT CORPORATION

WRIGHT AIRCRAFT ENGINES

(Continued form preceding page)

Pitcairn Mail Line Now Known as Eastern Air Transport

THIS fashion of changing names has extended to Pitcairn Aviation, Inc., operators of the Atlanta, Miami and New York air mail line. We are informed that this mail line will operate henceforth under the name of Eastern Air Transport, Inc., which was adopted to distinguish it from Pitcairn Aircraft, Inc., Pitcairn Aviation of Pennsylvania and the Pitcairn-Cierva Autogiro Company, which remain under their original ownership and management.

Those having business with the mail line, Eastern Air Transport, Inc., should note the change of its address to Sperry Building, Manhattan Bridge Plaza, Brooklyn, New York.

REGULATING AIR TRAVEL

New Air Traffic Regulations in Effect

GREATLY increased demands upon air transport lines resulted from the Department of Commerce's recent regulations governing the operation of this branch of aviation activity. Through Assistant Secretary Clarence M. Young it was learned that the new requirements are substantially as follows: (1) No more transport lines to be inaugurated until ground services are in operation. This means lighted airways, radio beacons, weather communications, emergency landing fields, radio communication systems and satisfactory airports must be present and in good working order. If the Government has not been able to provide these navigational and operating aids the operator must do so. (2) Passenger-carrying airplanes must not come below 500 feet. If forced to that level by weather or other conditions, pilot must land.

Full details of the new regulations may be procured by addressing the Department.

Pilot's Examinations Modified

MAJOR YOUNG also smoothed some of the difficulties from the path of the pilot and student pilot. Hereafter applicants for licences will not be required to pass new examinations upon subjects which have been passed by them during the past seven months, but a new application must be filled out showing that they have passed the subjects in question.

Although a limited commercial pilot, for instance, fails in one subject in his written examination, physical or flight test, he may apply again within seven months and take only that part of the examination he failed originally.

At the same time, word was received from the Department that all pilots carrying passengers for hire MUST APPLY AT ONCE for a "Pilot's Rating Authority," showing the types of ships which may be flown by him, conditions of operation and the geographical limits of his operations.

Two Changes Asked in Ohio Air Law

AT Dayton and Columbus agitation has been started for changes in the Ohio Air Law. In Dayton, City Manager F. O. Eichelberger is preparing to go before the legislature and attempt to get through a revision to the law, which prohibits a municipality from contributing to the maintenance of an airport outside of its city limits, or to privately-owned airports.

Crouse-Hinds illuminated wind indicator

His activity is based on the fact that Dayton's municipal airport is located at Vandalia, a suburb, and not within Dayton's limits. Various Dayton civic organizations cannot see the justice of denying a city its right to maintain its own airport, even though it might be outside the city limits. They are trying to make Dayton a port of call on various mail and passenger lines, adding thereby to Dayton's prestige in matters aeronautical. The city has been paying part of the expenses at Wright Field, as well as salaries of hangar crews, and desires to spend its money at its own airport in the future.

In Columbus, Major Wm. F. Centner, superintendent of Port Columbus, has asked for creation of an air board for the municipal airport, to advise it in matters pertaining to advertising, promotion and general development. Provision for such a board is not apparent in the existing law.

L. A. Airport Made Port of Entry

WESTERN Air Express Airport, on Valley Boulevard near Alhambra, Cal., a suburb of Los Angeles, has been designated as an official port of entry for international air commerce. This action is expected to result in an improvement in the service between Los Angeles and Agua Caliente, Mexico, famous resort where movie actors, musicians, promotors and race-track devotees may be found at this season.

Heretofore the afternoon plane southward bound has been forced to stop for customs examinations at San Diego, as well as all northward bound planes both in the morning and afternoon.

NEW DEVICES

Boeing Using Low Voltage Arc Welder

BOEING Airplane Company, which is extensive user of electric arc welding, has developed a low voltage, low amperage AC arc welder that permits the welding of tubing and sheet stick from .035-inch to .375-inch thick. DC welding sets are also used. Fuselages, landing gears and other steel structures are assembled by arc welding. Torch welding is used by Boeing to a limited degree in small sub-assembly work.

N. A. T. Testing Artificial Horizon

THE Sperry Instrument Company has devised a new instrument which is now being tested by pilots of the National Air Transport, according to E. P. Lott, operations manager. Known as the Sperry Horizon, it is essentially the same as the one used by Lieut. Doolittle in the recent blind flying experiments, and will be used by N. A. T. pilots as aid to navigation in thick weather.

It consists of a dial tinted to represent the horizon, a tiny free-swinging airplane and a line stretched across the dial. This line is always parallel to the true horizon, and when the pilot is forced to resort to instrument flying he can keep his ship in the proper attitude by watching the tiny airplane and its relation to the dial, and maintain the line across the dial in a correct position. It is actuated by a gyroscope.

Copper Dome Aids Airport Identification

SURMOUNTING the administration building at the Western Air Express terminal in Los Angeles are three burnished copper turrets, placed there so that the sun, gleaming as on a mirror, will attract the attention of passing pilots and thus advertise the presence of the port. In the daytime, with no lights visible and a dozen or more airports in the same neighborhood, it is ofter difficult to distinguish the one desired, especially at a distance. When the flash of these turrets is seen, however, it is easy to locate the W. A. E. airport.

Illuminated Wind Direction Indicator

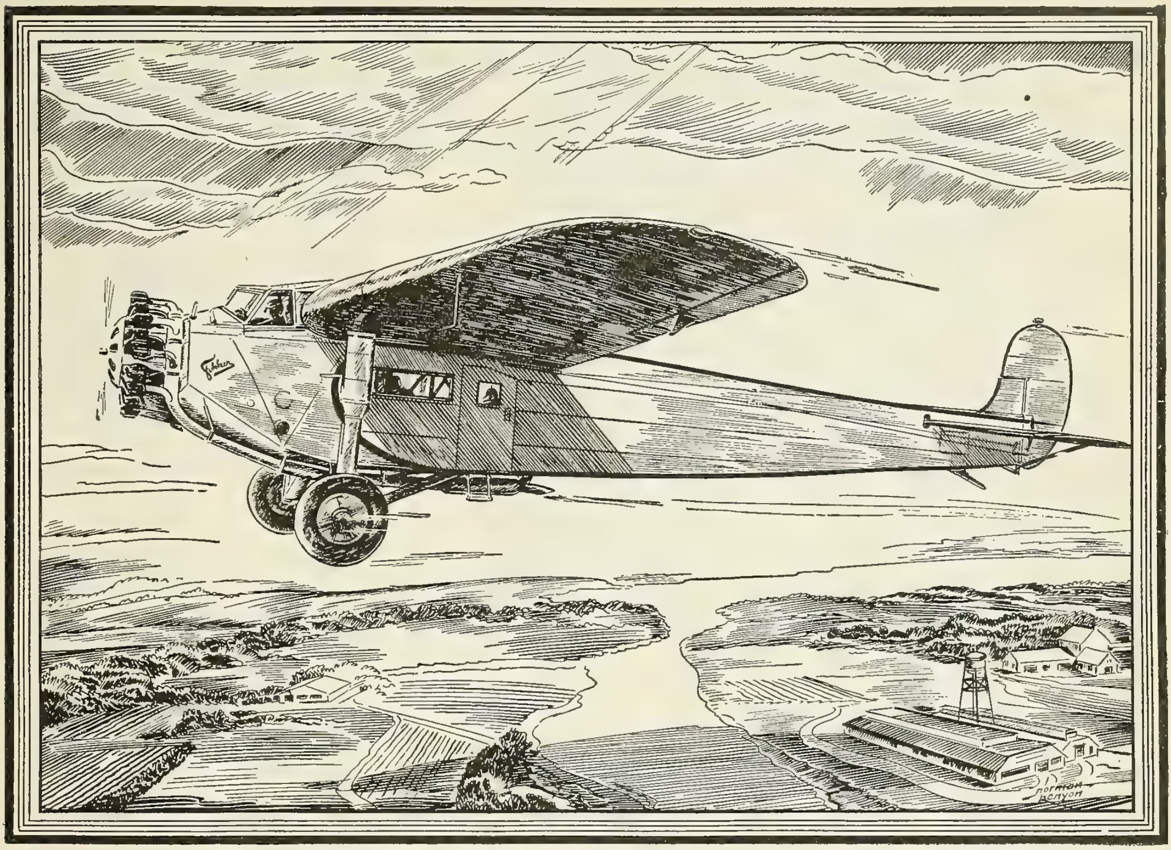
CROUSE-HINDS CO., Syracuse, N. Y., is introducing another illuminated wind direction indicator in the form of a swinging T. Light metal framework is covered by very thin metal plate; the whole is painted chrome yellow with broad black stripes and fitted with an intersecting row of vapor-proof lights. These are both red, yellow and green, and may be changed from one to another to give pilots signals concerning landing conditions.

"CONTRIBUTIONS from the Radio Frequency Laboratories No. 15," by F. H. Drake and Raymond M. Wilmotte, of the Aircraft Radio Corporation, describes an investigation for the purpose of comparing the transmission characteristics in daytime of horizontally and vertically polarized waves from an airplane. A doublet antenna was used, each arm of which extended from wing tip to tail for the horizontally polarized waves, and a rigid antenna six feet high for the vertically polarized wave.

It was found that the signal from the sky ray for distances of the order of 150 miles was always stronger with horizontal polarization than with vertical. It was found with the direct ray that the signal from the vertically polarized wave was stronger than from the horizontally polarized wave over highly conducting ground. The reverse was found to be the case over badly conducting ground.

A very effective ground antenna was investigated which, when used horizontally, resulted in little effect on the signal received by the height of the antenna from the ground. The effect of the conductivity of the ground was studied in the investigation, and a method is described for deducing the transmission characteristics for flights of any altitude.

FOKKER FACTS—II (SUPER-UNIVERSAL)



4 OUT OF 10 ARE FOKKERS

MORE than 40% of the transport planes on American air lines are Fokkers. There are sound reasons for this . . . Fokker performance has won the approval of pilots. Fokker comfort has won the patronage of passengers. Fokker operating figures have won the purchase orders of transport executives.

An ever-increasing group of pilots and executives give Fokker first place for safe and economical performance. For these men know that Fokker planes have flown over 25,000,000 miles on transport lines, establishing a record for dependability that has never been approached. They know that Fokker has built more planes than any other manufacturer on earth. They know that Fokker planes have made twice as many great pioneering flights as any other make of plane. They know that Fokker design is now backed by the vast scientific resources of General Motors Corporation. In short, they know that Fokker planes of today are the planes of tomorrow.

For the use of business executives, for pleasure, and for transport use, Fokker now makes ten different models of airplanes: single and multi-engined types, land planes, sea planes, flying boats, amphibions. Requests for information or demonstration are invited, and will be promptly answered. Fokker Aircraft Corporation of America, General Motors Building, New York.

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PONTIAC MUNICIPAL AIRPORT-A1A

By KARL F. ZEISLER

A YEAR ago last fall the field that was to become the municipal airport of the city of Pontiac, Michigan, was an unoccupied farm. Today that same field has been officially recognized as the first in the United States to receive an A1A rating by the Department of Commerce. The story of how Pontiac, a city of 80,000 developed a field into an A1A airport at a cost of less than $250,000 should prove encouraging to other small cities which are struggling with the problem of providing adequately for aviation development.

"The rating issued to the Pontiac airport is known as A1A, the highest issued under the Airport Rating Regulations," said Major Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, in announcing the issuance of the rating. "However, it is not intended that n A1A rating convey the thought that the ultimate in airport design has been provided. The ratings are convenient yardsticks and serve as a key to a detailed story about the airport and its equipment."

The city of Pontiac determined from the beginning to establish an airport that would comply in every respect with the Federal regulations for an A1A field. A bond issue was proposed and approved by the voters on May 8, 1928, providing $180,000 for capital costs. Surveys were made of thirteen avilable sites, and one was selected for its numerous advantages, chief of which was good natural drainage. On September 12, negotiations were completed for the purchase of 160 acres, making a total of 240 acres.

Work was immediately started on plowing, grading, packing and seeding the land, which was done by city employees with municipal equipment, and a contract was let for construction of a municipal hangar. A little more than a month after the land was purchased, November 27, 1928, the field was officially opened with the inauguration of air mail service by the Thompson Aeronautical Corporation, operator of C. A. M. 27.

The first anniversary of the opening of the field was celebrated November 27, 1929, with the dedication of a $110,000 hangar, administration building and shops erected by the Thompson corporation as its Michigan operating headquarters. Meanwhile, the field had been formally dedicated on June 15, 1929, on the return of forty-six ships participating in the First Michigan Air Tour.

Application for A1A rating for the airport was dispatched to the Department of Commerce on May 29, 1929. Subsequently, Department of Commerce inspectors visited the field and suggested certain changes, which were immediately complied with by the city. The field was then recommended for the rating, and having made the initial application, Pontiac was accorded the first A1A rating, as announced by Major Young on February 11, 1930.

Pontiac Municipal Airport is located on the airline midway between Ford Airport and the municipal air-field at Flint, approximately six miles northwest of the center of the city. It is in the midst of a flat area with no obstructions within several miles. The dimensions are 3,960 feet east and west, the direction of the prevailing wind, and 2,640 feet north and south. The entire area is availble for landing in all directions. The field is fenced along the sides facing the two paved highways which connect it with the city. The sandy gravel soil makes drainage structures unnecessary and permits safe landings in all weather. In the winter snow is packed by means of huge rollers made from telephone cable reels.

The two hangars provide 24,400 square feet of plane storage space. The municipal hangar is of brick and steel construction, 100 by 100 feet with a twenty-foot clearance. It was designed by city architects and approved by the Department of Commerce. Along the entire north side a twelve-foot brick lean-to provides quarters for the operations office, rest room and heating plant. The hangar is available for permanent and transient storage, as well as refueling and serviceing.

The Thompson plant consists of a hangar of design similar to the city's, 120 by 120 with a twenty-foot clearance, a headquarters building 40 by 120, two stories high, and separate buildings housing quarters for heating, testing, welding, dope and engine overhaul. Thompson holds sales and service franchises for Stinson aircraft and Wright engines, and is equipped to service and repair these products as well as all other types of aircraft and engines. A radio transmitting station to send weather bulletins to TAC air mail planes is being installed.

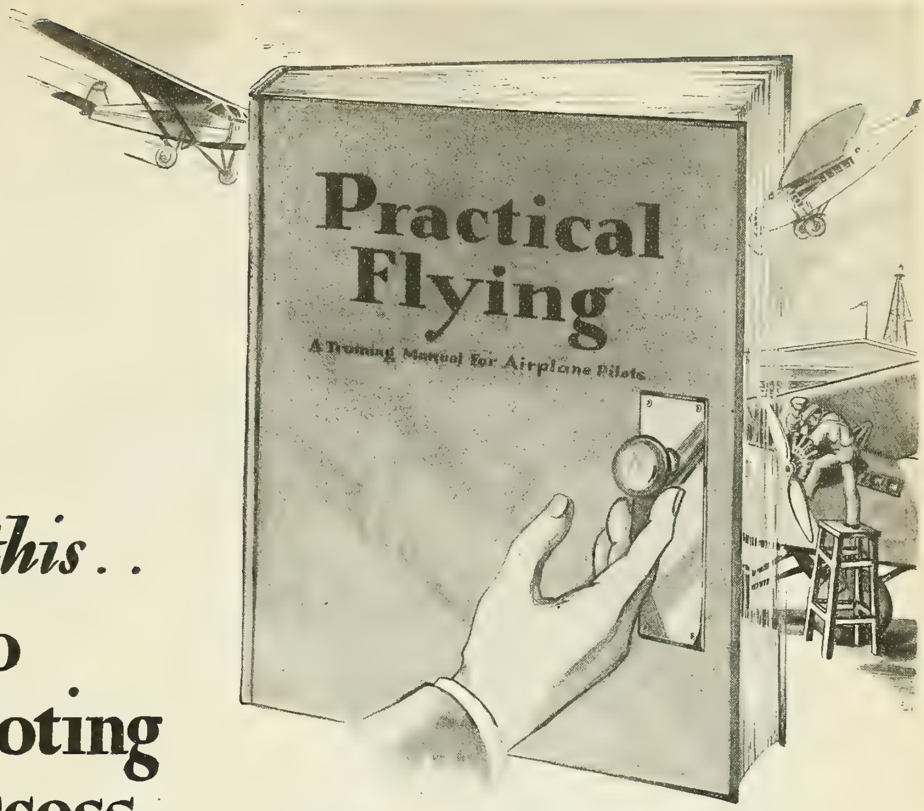
Beacon and hangar at Pontiac

The illuminating installation is one of the most complete in the country. The automatic control panel, which was designed by H. J. Morton, city electrician, is located in the operating office of the city hangar, from which all lights in the circuits are visible. Toggle switches operate relays controlling all circuits, and are provided with pilot lamps that indicate when the lights are working. By snapping the switches, the operator can, in a few seconds, flood the entire field with light, as well as control the boundary, beacon, ceiling projector and hangar illuminating lights.

Boundary lights surround the field, being mounted on pipe standards and supplied with current by an underground cable circuit, so connected to alternate lights that at least half are operating in case one circuit should fail. Two batteries of floodlights, each containing six units with 3,000-watt incandescent bulbs, are centered at the edge of the east and south landing areas. A revolving beacon mounted on a fifty-foot tower is equipped with a 1,000-watt lamp and automatic lamp changer. A ceiling projector is permanently mounted outside the operations office. The entire hangar is floodlighted at night, and auxiliary floodlights in front facilitate entrance and exit of planes. An illuminated wind cone, with cardinal points of the compass marked by

(*Continued on next page*)

Left, line-up of planes at Pontiac for the Michigan Air Tour; right, interior of the Thompson hangar at Pontiac airport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A Training Manual for Airplane Pilots

Open this . . Door to Safe Piloting and Success

Thousands are Learning to Fly with this Famous Book

"FLYING is not a mysterious art for a chosen few . . . it is not difficult to understand; for an airplane is a vehicle, and nothing more. All that is necessary is a proper understanding of its powers and limitations"—and then, in thirty-five concise, direct, and interesting chapters Major Byron Q. Jones, veteran Army Instructor, gives you that "proper understanding." He tells you frankly just what qualities you must have to make a successful flyer . . . he tells you straight from the shoulder what your chances are in commercial Aviation.

To that question you've been asking—"Can I be a Pilot?"—he answers, "Yes!—and I'll show you how." He gives you, in plain interesting English the invaluable advice he gave to our war-time flyers. He gives you the same sound counsel that established him as the *safest* trainer of men in *any* Army. First he takes you over a plane, inch by inch, explaining the use of every part. He introduces you to the language of Aviators; telling you the meaning of technical terms, and explaining their slang. Then he puts you into flying clothes, showing you just what each piece of special equipment is for, and you're off for the first flight—with Major Jones telling you what to watch, showing you how to get the most from your training.

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This book is so complete and practical many flying schools use and endorse it. Men with many hours in the air read it, finding valuable hints and practical facts that improve their flying. Thousands of pilots and students of flying are using it to get started on their careers in Aviation, for they find answers to all the questions that puzzle them—and sound advice that is shortening the distance between them and success.

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Gentlemen: Please rush me my copy of "Practical Flying" by Major Jones. At the end of five days I will either remit $3.00 or return the book.

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(Continued form preceding page)

red lights, is mounted on the hangar. Red obstacle lights on the poles of a power line on one side of the field complete the lighting installation. Two separate 4,800-volt power lines provide current for operating the system.

The field is used at present by three commercial operators. Thompson operates day and night air mail service and a summer amphibion passenger service from Detroit to Cleveland. Skyways, Inc., maintains a flying school and taxi service. J. A. N. Aircraft Company sells Mono Aircraft and operates a flying school. In the summer, Stout Air Services, Inc., maintains day and night sightseeing planes during week-ends.

Revenue from hangar storage, fees for commercial operators, sale of fuel and concessions amounts to some $300 a month at present, and will be increased in the summer. Day and night operators are maintained, with additional attendants in the day time. Control of the field is under G. Donald Kennedy, airport director, who was instrumental in selecting the site and designing the hangar and general layout, which provides for future development of hangars and service buildings.

Municipalities interested in the cost of an A1A airport may gain information from the following itemized account of the expenditure of $170,607 of the $180,000 bond issue for capital expenses. Sale of bonds, $235; purchase of 160 acres, $103,500; paving tax, $4,070; topographical survey, $388; clearing, $2,852; drainage, $435; grading, $4,688; fence, $4,179; hangar, $30,240; lighting, $14,863; water supply and fire protection, $3,150; gas and oil supply, $731; landing facilities, $22; signs and photographs, $140; engineering and inspection, $1,114. Out of budget items, the city purchased the additional eighty-acre tract and provides maintenance funds, which eventually will be balanced by airport revenue.

UNION AIRPORT, LINCOLN, NEBRASKA

A NEW $500,000 air-field, known as Union Airport; is being constructed at Lincoln, Nebr., by the Sidles Airways Corporation. A half-section of land running a mile east and west and a half-mile north and south has been acquired as the airport site. On the west is U. S. Highway No. 77, and on the south, a graveled county road. The airport has a naturally smooth contour and natural drainage. It will have surfaced runways a mile long east and west.

It is the endeavor of Sidles Airways Corporation to develop this field to meet with the specifications outlined for Curtiss-Wright fields over the country. All buildings are being constructed of brick and steel with stone trim, incorporating a style of architecture which will be followed in all future buildings at the port.

There are already three airports located at Lincoln. These ports are well known not only for the practical mid-continent location with numerous advantages and conveniences, but for the facilities offered.

The first unit of the project is already well under way, and the first hangar is progressing rapidly. This hangar is 120 feet long by 132 feet wide with a 22-foot door clearance. It will afford facilities for a parts department where parts for many standard types of airplanes will be stocked, a repair shop where mechanical servicing facilities will be available, showers and classroom. Work on the administration building will begin upon completion of the first unit. This building will contain the general and executive offices, a modern cafe, baggage room, waiting room, pilots' quarters, classrooms and a meteorology station.

The officers of the Sidles Airways Corporation who are responsible for the project are: Harry B. Sidles, president; H. E. Sidles and F. S. Sidles, vice presidents; Charles Stuart, secretary and treasurer.

Other Nebraska Airport Projects

THE amount spent to date on the Lincoln Municipal Airport is $81,574. This includes lighting, runways, water supply, gasoline fueling equipment and operation and maintenance, but does not include a $50,000 hangar which was recently completed by the Lincoln Airplane School under a lease arrangement with the city. A sanitary sewer system has been started at the field and will be completed early this spring. Negotiations are under way for a second modern hangar.

The Seward, Neb., Chamber of Commerce has selected a 65-acre field, which has been approved by W. L. Gillette, representing the United States Department of Commerce, and the tract will be secured by the community for an airport. The government will equip the field as soon as a lease is furnished by Seward authorities.

An election will be held at Broken Bow, Neb., this spring to determine whether to vote bonds or levy a tax to provide a new airport. A flying club has been formed at Broken Bow, with fifteen members, and a competent instructor will be employed soon to take charge of the group.

An agreement has been reached between the Falls City, Neb., city council and the Porterfield Aviation Interests, Inc., of Kansas City, whereby the latter concern leases the Falls City airport for seven years at the rate of $560 annually. The aviation company will assume all expenses of the field, and maintain police and develop it. The port comprises eighty acres.

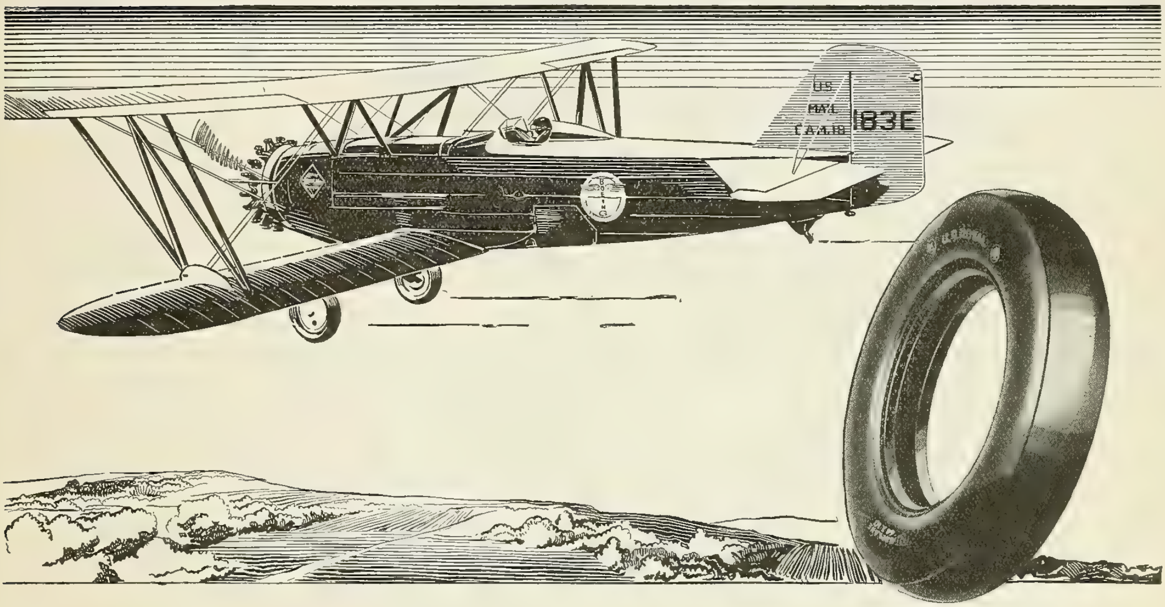
Land has been leased by the Boeing system for the erection of a radiophone station at the Sidney, Neb., emergency landing field. The station will greatly lessen the dangers of flying the mail through the dense fogs which frequently enshroud the Lodge Pole Valley in Nebraska.

The Kearney county, Neb., board of supervisors is planning to develop an airport near Minden, Neb., this summer.

© Davis & Wilson, Architects

Architects' drawing of Union Airport which the Sidles Airways Corporation is building at Lincoln, Nebraska

Air-Minded for 22 Years



Aviation is no new plaything with the United States Rubber Company. It has been a *business* with U. S. since 1908. The world's *first* airplane tire was the first contribution of U. S. engineers to safer, more economical flying. Since that historic development many U. S. contributions to aviation have followed—larger, tougher tires—then today's Web-Cord tires of still stronger but lighter construction. U. S. offers today's aircraft manufacturers a rubber engineering service that is air-minded by *experience* rather than by fancy. Here you will find competent assistance with any aviation problems in which rubber plays a part.

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EIGHTEEN trim Curtiss Hawk pursuit planes, neatly lined up on the frozen surface of Lake St. Clair, Michigan. Eighteen Curtiss D-12 engines purring confidently. Eighteen alert pilots of the First Pursuit Group, the Army's finest, bundled in their tiny cockpits, eager for the start. A signal from the leader, the deep, full-throated roar of 8,000 Horsepower, and the Arctic Patrol flashes into the air and heads West.

West—for a battle with Old Man Winter over a 3,500 mile frontier, to Spokane, Washington, and back. No bands blaring, no natty uniforms and polished boots, no cheering air-meet crowds on this trip. This was grim business—a supreme test of a fighting unit operating far from its home base in the dead of winter.

Major Ralph Royce, commanding officer, Arctic Patrol Flight.

Bitter cold—planes standing all night on open fields without a trace of shelter, and frozen solid to the snow and ice next morning—pilots tumbling out at daybreak with the thermometer at 40 below—heartbreaking work on cold engines with numb fingers—hours of flying, chilled to the bone, over rough, treacherous country with the snow-laden wind howling a gale.

One day flying single file at 18,000 feet through a dangerous mountain pass, with the thermometer 70 below! The next, roaring along barely 50 feet in the air, following the railroad tracks and landing "blind" in a raging blizzard. Damaged landing gears—emergency field repairs with almost no facilities—frozen faces, hands, feet.

Three gruelling weeks of it—three weeks of the most severe test of personnel, planes, and engines ever made—and then Selfridge Field heard the welcome, familiar drone of the D-12's. The Arctic Patrol was home, battered and weary, but triumphant, its troubles over, its mission accomplished—another shining chapter added to the brilliant war and peacetime record of the First Pursuit Group.

The Curtiss Hawks and Curtiss D-12 engines are standard fighting equipment of the Army Air Corps. We're a bit proud of the terse comment to the press of Major Ralph Royce, Commanding Officer of the Arctic Patrol, as he stepped, grinning, from his Hawk at Selfridge Field: "The planes and engines were wonderful!"

CURTISS AEROPLANE &

Offices: GARDEN CITY, N. Y.

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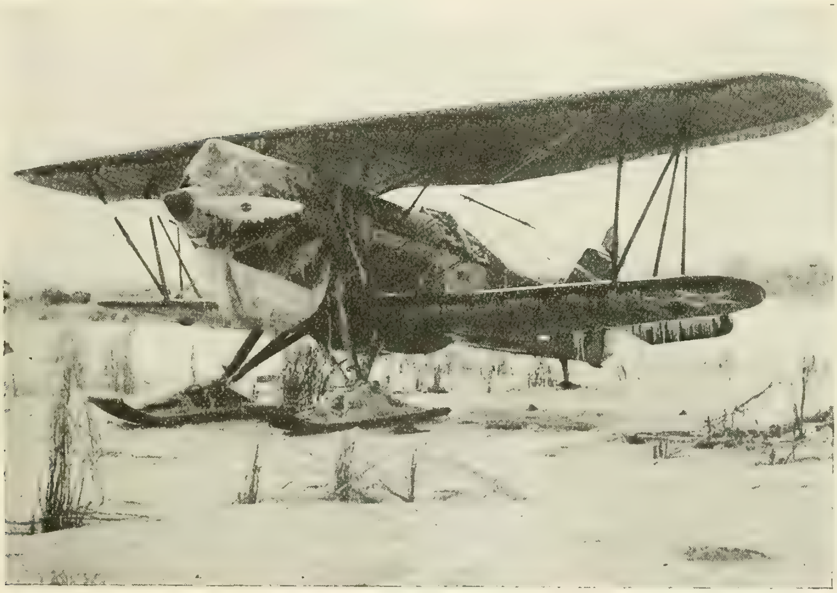
ARCTIC PATROL FLIES WEST!



WINTER'S icy grip — an example of conditions encountered by the Arctic Patrol. These sturdy Curtiss Hawks with their faithful D-12 engines, were never under shelter throughout the 3500 mile trip.

Curtiss planes and Curtiss engines have been making aeronautical history for twenty-five years. The 1930 Curtiss engines are thoroughbreds—worthy of the Curtiss name.

CONQUEROR—

600 Horsepower, 12 cylinder, liquid cooled, Vee type, direct drive or geared models. Incorporates basic design principles of the famous Curtiss D-12. Its tremendous power, low frontal area and unfailing reliability have made it a favorite with air transport and mail operators.

CHALLENGER—

185 Horsepower, six cylinder, air-cooled radial with two-throw crankshaft. New U. S. Department of Commerce rating of 185 H.P. at 2000 R.P.M., new smoothness and quietness of operation, and the same old reliability that brought to it the World's Endurance Record.

CRUSADER—

125 Horsepower, six cylinder in line, air cooled inverted type. Lightness and simplicity of air cooled engines combined with low frontal area of in line construction. Especially desirable for smaller sport and training aircraft. Watch for production announcement.

MOTOR COMPANY, INC.

Factories: GARDEN CITY, BUFFALO, N. Y.

WRIGHT · CORPORATION

TECHNICAL

PROBABLE TREND of LANDING GEAR DESIGN

Dwight Huntington

MANY pilots number amongst their interesting experiences crashes resulting from the failure of undercarriages that were structurally weak. Too many planes, it seems, have terminated creditable hops by going down on their knees, like ships of the desert, but for no better reason than lack of substantial undercarriages. For the sake of brevity, however, I am assuming in this article that every undercarriage is sufficiently well designed and constructed to enable it to perform, without evidence of failure, its principal purpose of supporting the loaded ship under reasonable landing conditions.

Recalling the various distinctive types of undercarriages, such as the all-skid and catapult combination of the Wrights, the all-wheel undercarriage of Curtiss, the combined wheels and main skid type of the Wrights, Nieuport and Antoinette, or the wheels and tail skid gear of Bleriot and others, one is inclined to venture the opinion that radical innovations in undercarriage design were confined to the first decade of the airplane's existence. Although ship design has progressed from monoplane and box kite through the Venetian blind fancy and back again, the undercarriage unit has received little consideration other than changes in detail, such as the substitution of oil for rubber in shock struts, the addition of brakes and similar refinements.

The type of undercarriage in general use today, comprised of a pair of wheels slightly forward of the C. G., with either a tail wheel or skid as the third point of support, antedates the general adoption of wheel brakes on planes by more than fifteen years. For the past three years numerous commercial jobs have been provided with brakes, and during this period many accidents have resulted from the limitations placed on their use by undercarriages not fundamentally designed for them but to which they were lazily adapted. Yet no appreciable effort has been made to remedy the faulty situation.

Yet the advantages of brakes from the safety standpoint assure their general use for many years to come. Likewise, the all-wheel type of gear is certain to grow in popularity, because it permits easier ground handling, faster take-off and absence of skid damage to landing fields. Universal adoption of these improvements is delayed principally by the cost of brake wheels. It appears likely that the plain wheel and tail skid gear in vogue so long will be continued for several years on small low-priced jobs, at least until much cheaper brake wheels are developed and marketed.

In a like manner ski, skid, caterpillar and other types of undercarriages will be used advantageously in special cases. For the large majority of land and amphibion type planes, however, the all-wheel, brake-equipped undercarriage will probably find favor and a return to the four-point gear appears inevitable.

Lending support to the fact that, in order to derive the full benefits of wheel brakes, a complete redesign of existing undercarriages is necessary, other important factors bear on the subject of alteration. The increasing popularity of amphibions, both pontoon and hull types, having their flotation systems almost resting on the ground, affords designers greater latitude because of the more compact gears possible. Again, in strictly land types, which are predestined because of their lower manufacturing costs and consequently lower sales prices to dominate the small plane market for many years to come, the general adoption of inverted in-line and horizontal opposed engines will also decrease the required heights of undercarriages due to the higher placing of the thrust lines, even granting increased vision over radial type engines.

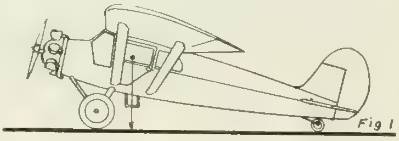


Fig 1

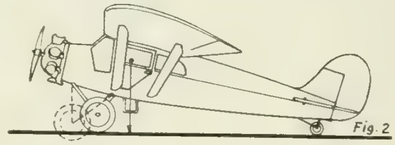


Fig. 2

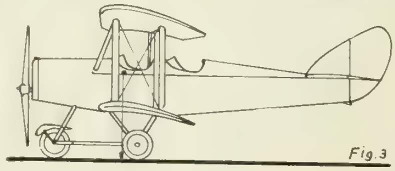


Fig. 3

In addition to the safety that can be afforded by increased effectiveness of brakes, the comfort and convenience of passengers and crews are entitled to further consideration by designers. In brief, the ideal undercarriage would possess the following attributes:

On the ground, it would support the plane in level flight position—(a) facilitating access by passengers and crew as they enplane; (b) affording increased comfort to all occupants in chairs and berths during the time the plane lays over at terminals for taking on or discharging passengers, mail and express and for refueling; (c) increasing the range of visibility forward for pilots, assuring safer taxying and taking-off (d) enabling the plane to accelerate more quickly, since the tail is already carried high, diminishing take-off time and distance.

In flight, it would offer minimum of air resistance either by thorough fairing or complete retraction, a simple and dependable method being assumed in the latter instance.

In landing, it would—(a) permit the ship to be landed with the wings at an angle approximating maximum lift of airfoil; (b) enable the complete utilization of brakes, preferably on all wheels and particularly the front ones, without any possibility of nosing over on unfavorable terrain (relieving the pilot of serious strain), with all wheels working at all times, thus affording maximum bearing area; (c) not tear up turf unduly; (c) control easily on ground at any speed, either by wheel or brake control, preferably the former; (e) gradually assume a normal level flying position automatically as it rolls to a stop, thus completing the cycle of usefulness and enabling the passengers to deplane conveniently.

From the foregoing it becomes immediately apparent that the present type of undercarriage, as illustrated in Figure 1, is quite inadequate for modern requirements, possessing but three of the ideal features enumerated. In fact, the type of three-wheel undercarriage illustrated in Figure 3, which was used on several planes more than a decade ago, is more suited to present requirements than the gear in general use today. Moreover, an adaptation of the present type, in which the wheels are sent forward just prior to landing, as shown in Figure 2, and automatically assume their normal take-off position while rolling to a stop,

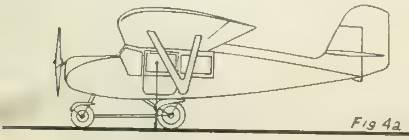


Fig 4a

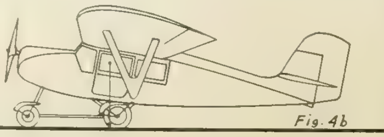


Fig. 4b

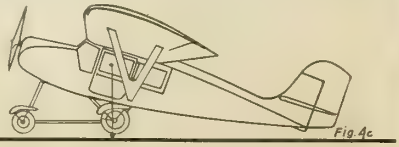


Fig. 4c

will but feebly answer present demands. The same applies to another possible modification making use of an auxiliary dropable bow skid to prevent nosing over, which at best will be but a temporary makeshift.

In Figure 4a, we see a modern ship having an undercarriage substantially similar to the pre-war stuff of Figure 3. The undercarriage would remain in this position while on the ground and in flight, unless retracted after the take-off. In Figure 4c, is shown the same undercarriage just prior to landing. The front hydraulic strut has been released by the pilot and the front wheel drops to a position that places the wing at its angle of maximum lift in relation to the ground, the C. G. being preferably in front of the rear axles. The resulting nosing over couple is utilized advantatgeously in contracting the front shock strut, and as the ship comes to a stop, it automatically assumes its level flight position. Similarly, Figure 5 and 6 illustrate the adaptability of this type undercarriage to seaplane and boat amphibions, respectively.

In all types of retractable undercarriages, the ideal theoretical design would enable the gear to be hauled in out of the draft, completely retracted. In many cases, however, semi-retraction will continue to be more practical, especially in amphibion models in which some retraction is an obvious necessity. But whether the undercarriages on the pleasure class of small landplanes should be retracted at all at present is open to question. Aside the slight additional first cost of the ship, which would soon be written off in fuel saved, there is the problem of safety. From the past brief experiences with retractable undercarriages in the hands of capable pilots, it is easy to visualize the consequences of forgetful landings by comparative novices in flying. Furthermore, from the standpoint of strict economy, a folding wing feature is more economical than a retractable undercarriage.

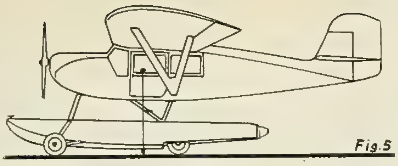


Fig. 5

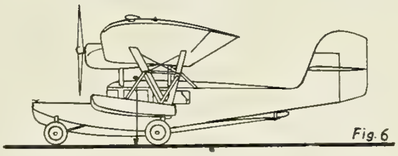


Fig. 6

For big ships in the flying stock category, however, complete retraction of undercarriages will probably be demanded by the airlines. The large savings in operating expenses by decreased fuel consumption, through constant daily usage over many years of service, would reduce to insignificance the slight initial costs of the retracting complications. Moreover, the presence of mechanics in the crews would afford assurance that the jobs of placing and retracting would be properly handled without annoyance to the pilots.

In conclusion, it appears probable that designers of all but the cheapest models of planes can increase the safety and serviceability and, consequently, the saleability of their products, through a more thorough study of the limitations of the present antiquated ytpe of undercarriage and today's design requirements.

WESTERN
MODEL 7-1
ENGINE

THE Western Model 7-1 airplane engine is a seven-cylinder L-head type of radial air-cooled power plant. It was developed by the Western Enterprise Engine Company of Los Angeles, Calif. This engine is rated at 170 horsepower at 1,800 revolutions per minute and to facilitate repairs, offer the minimum obstruction to the vision of the pilot when mounted, and to give as little air resistance as possible, has been designed with a minimum number of parts.

The L-head valves are located at the rear of each cylinder. Champion No. 9 spark plugs are provided, two for each cylinder. There are two Scintilla MN7-DF magnetos, and a Stromberg NA-7R carburetor is provided.

Specifications

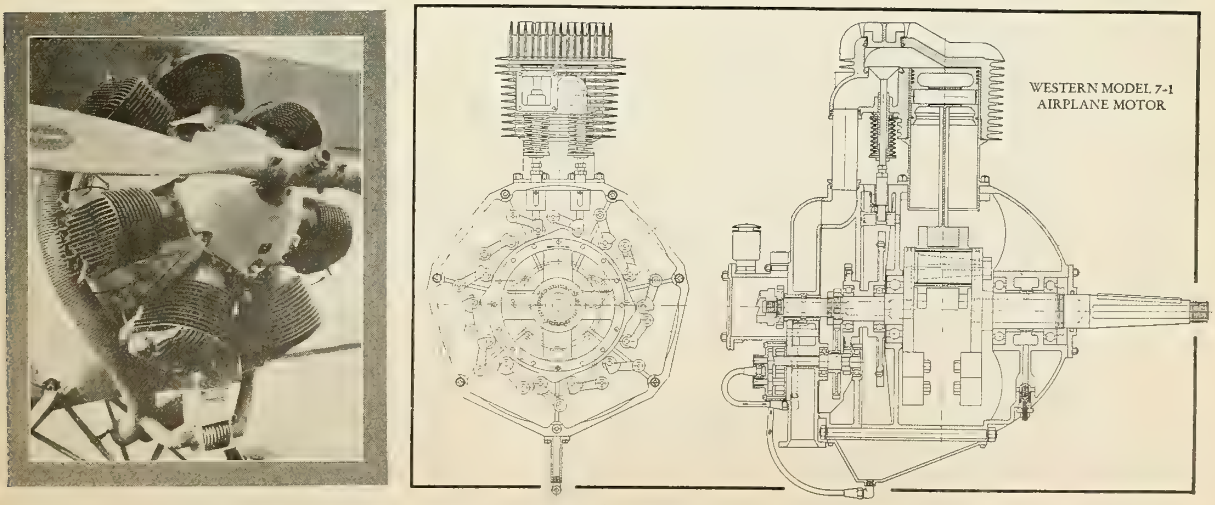
Bore	4.750 inches
Stroke	6 inches
Displacement	744.25 cubic inches
Radial diameter	39 inches
Weight	480 pounds

TURNING TRIALS OF THE "LOS ANGELES"

N.A.C.A. Report 333 by F. L. Thompson presents a description of the method employed and results obtained in full-scale turning trials on the rigid airship U.S.S. *Los Angeles.* This investigation was carried out in conjunction with pressure distribution and stress investigations. The pressure and turning investigations were conducted by representatives of the National Advisory Committee for Aeronautics, and the stress investigation, by the Bureau of Aeronautics, Navy Department.

The results of this investigation are not sufficiently comprehensive to permit definite conclusions as to the variation of turning characteristics with changes in speed and rudder angle. They indicate, however, that the turning radius compares favorably with that for other large airships, that the radius is independent of the speed, that the position of the point of zero yaw is nearly independent of the rudder angle and air speed, and that a theoretical relation between radius and angle of yaw in a turn gives a close approximation to actuality. The method of determining turning characteristics by recording instruments aboard the airship appears to be satisfactory, with the exception that a better method of determining the small angular velocities of airships should be devised.

Report 333 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.



Installation view and sectional drawings showing arrangement and details of the 170-horsepower Western aircraft engine

Kinner-powered Davis Monoplane, D1-K

D-1—Davis Monoplane with Le Blond Engine

TWO NEW DAVIS PLANES

THE Davis Aircraft Corporation has announced two new Davis monoplanes—the Davis D-1, powered with the Le Blond 65 radial engine, and the Davis D1-K, powered with the Kinner 90-horsepower engine. The Davis D-1 is manufactured under Approved Type Certificate 256 and the D1-K under Approved Type Certificate 272, issued by the Department of Commerce.

These new ships follow closely the general construction of their predecessor, the Davis V-3, although a number of changes have been made which add to their performance. Both the D-1 and the D1-K have the same wing section which has always been characteristic of Davis monoplanes. The wing combines both high-lay and general-purpose characteristics, and is tapered both in form and section. The wing unit, which includes a center section containing the gasoline tank, is supported by streamline steel struts and cross bracing of streamline tubing and wires. Spars are selected spruce, laminated and routed for lightness. Ribs are of dural. The entire leading edge is of sheet dural, screwed to spars and riveted to ribs. Strut fittings are wrapped and laminated completely around the spars. Drag bracing is double Hartshorn square rod. Compression members are considerably overstrength.

The Davis D1-K, powered with the Kinner engine, has a cruising speed of 105 miles per hour, top speed in excees of 125, and a landing speed of 40 miles per hour. The ship is reported to be capable of climbing 5,000 feet in five minutes, and has a service ceiling of 14,000 feet.

8he Davis D-1, powered with the Le Blond 65, has a cruising speed of 85 miles per hour, top speed of 101 miles per hour, and a landing speed of 38 miles per hour.

Both the D-1 and D1-K are sturdily built to withstand rough usage, with a low maintenance expense. Construction is of all-metal throughout, with the single exception of wingspars, and fabric covering. The design and construction of the planes is such as to make it possible to remove and replace the wings in a short time, without the necessity of re-rigging.

The fuselage is constructed entirely of steel tubing, 1025 S.A.E., except stressed members, which are of chrome-molybdenum. The engine mount is of 1025 steel tubing. It is detachable, with engine, by means of four bolts. Heavy gauge aluminum, which completely insulates the cockpits, is used for the fire wall.

Ailerons are of ample size, affording good controllability in stalling conditions. They are hinged to the auxiliary spar and tapered.

Covering of the entire ship is Grade "A" fabric. All metal members are protected by priming coats and tape. Finishing includes two brush coats and three spray coats of pigmented dope and two spray coats of lacquer.

The landing gear is chrome-molybdenum steel, fared to streamline form. The wheels are placed well forward, reducing tendency to nose over. Wire wheels are equipped with aluminum streamline covers.

Dual controls of the conventional stick and pedal type are provided. Controls in the front cockpit are detachable. Elevators and ailerons are operated by steel tube, rudder pedals by cable. Adjustable stabilizer is controlled by steel tubing. The stabilizer can be adjusted to four degrees plus and three degrees minus by lever and ratchet. According to the manufacturer, the ship can be flown safely with the stabilizer.

Shock absorbers are rubber cord. The tail skid is of the leaf spring type with detachable shoe.

Both front and rear cockpits are easily accessible and are arranged for seat type 'chutes. The front cockpit is provided with a door. Both cockpits are attractively upholstered throughout.

Accessories include fire extinguisher and first aid kit, located in rear cockpit; also tools. Adequate luggage compartment is provided. Equipment includes instrument panel with altimeter, tachometer, and oil pressure and oil temperature gauges. The panel is indirectly lighted. The equipment of the D1-K includes a primer. Complete wiring for navigation lights is included. Such additional equipment as navigation lights, battery, compass, air speed indicator, Edo floats, and skis can be provided.

Performance

	D-1 *Le Blond*	D1-*K Kinner*
High speed	101 m.p.h.	125 m.p.h.
Landing speed	38 m.p.h.	40 m.p.h.
Cruising speed	85 m.p.h.	105 m.p.h.
Service ceiling	10,000 feet	14,000 feet
Climb	700 ft. per min.	1200 ft. per min.
Fuel consumption, cruising	4½ gal. per hr.	6 gal. per hr.
Cruising range	300 miles	400 miles

G. E. WELD FEED

THE Goodyear-Zeppelin Corporation has developed an electric generating apparatus designed designed for use on lighter-than-air craft of the non-rigid type. The generator is capable of an output of 350 watts at 110 volts and weighs twenty pounds complete. It is designed to provide a portable means of supplying electricity on lighter-than-air craft moored on unlighted fields or to facilitate the landing or take-off of an airship from such a field. Under these conditions, the Goodyear portable generator can be used to operate a pair of floodlights mounted under the control cabin of an airship. In flight, the generator unit will provide a source of electricity for navigation lights and other electrical apparatus.

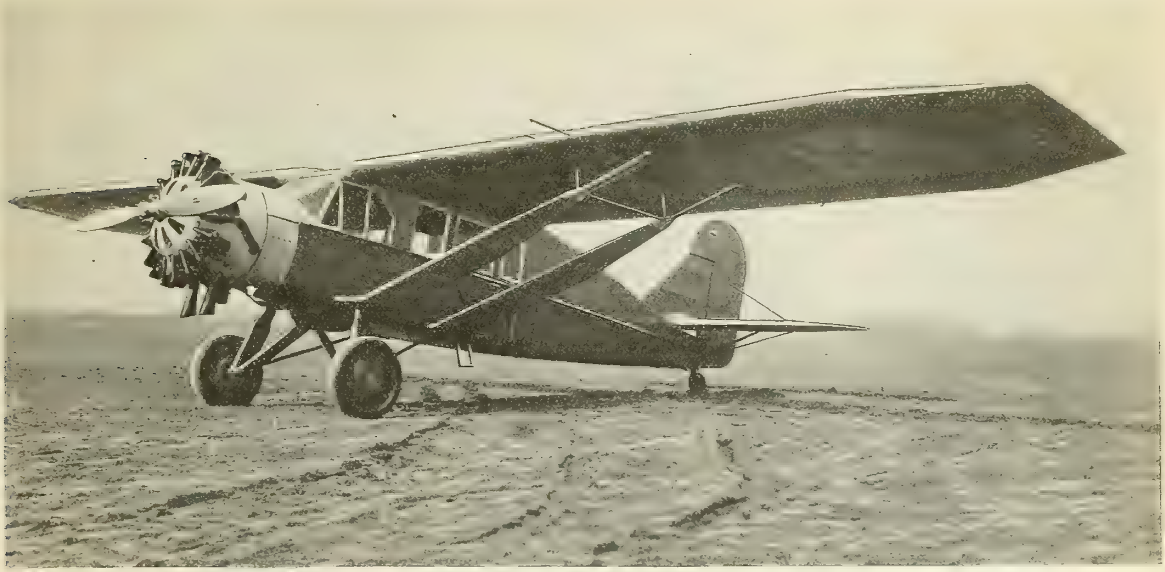
The equipment is comprised of a one-cylinder, four-cycle air-cooled engine mounted in tandem with the generator set.

ELECTRIC GENERATOR FOR DIRIGIBLES

THE General Electric Company has developed an improvement of the feeding device of the automatic felding head manufactured by the company. The device is designed to meet recent advances in the process of automatic welding which require higher welding speeds than formerly, resulting in heavier currents for welding and larger sizes of electrode wire than heretofore ordinarily used

The improvement in the mechanism comprises an addition of the geared drive to what was formerly the idler roller in the feeding mechanism, which feeds, without slippage and at a regular rate with moderate pressure between the driving rolls, the large sizes of wire which are hard to feed without excessive pressure upon the driving rolls.

By the use of this device in automatic welding, according to the company, it is possible to use curved nozzles to reach otherwise in accessible places and to weld in abnormal positions.



The Bellanca Pacemaker 400

WASP POWERED

Now available as an alternative to the Wright Whirlwind J-6 Nine. A deluxe custom-built airplane with tremendous reserve power, adequate wing surface, high speed, and a low landing speed.

PILOT . . . . FIVE PASSENGERS . . . . AND BAGGAGE

USEFUL LOAD

Gasoline, 112 gals.	670 lbs.
Oil, 8 gals.	60 lbs.
Pilot	170 lbs.
5 passengers and baggage	1,150 lbs.
Total useful load	2,050 lbs.

PERFORMANCE

High Speed	150 m.p.h.
Cruising Speed (at 1,700 r.p.m.)	130 m.p.h.
Climb at Sea Level (light load)	1,850 ft./min.
Climb at Sea Level (full load)	1,450 ft./min.
Service Ceiling, in excess of	20,000 ft.
Range, 5½ hrs.	700 miles

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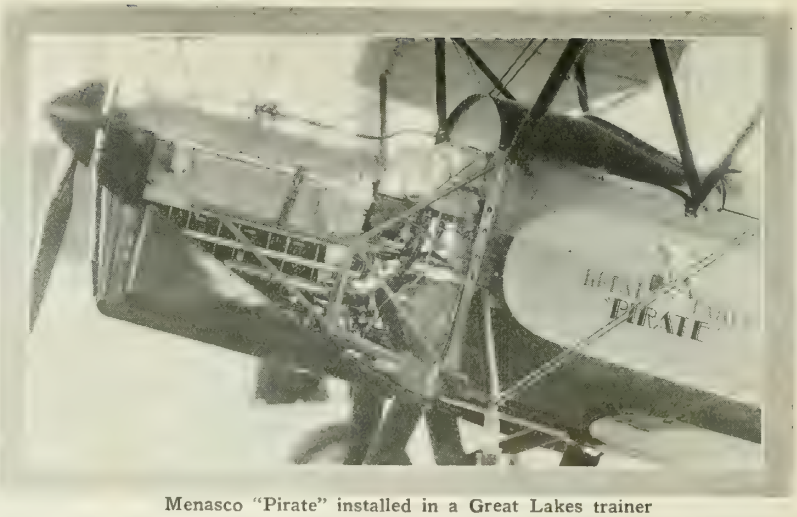
BELLANCA

MENASCO "PIRATE" ENGINE



Menasco "Pirate" installed in a Great Lakes trainer

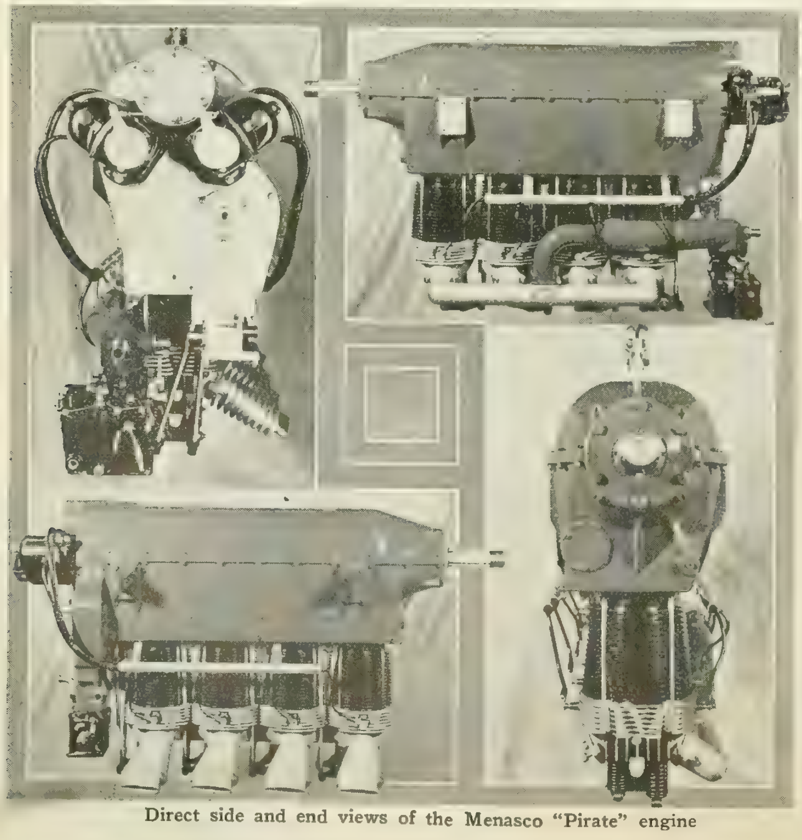
AFTER two years of development work by the Menasco Motors, Inc., announcement is made of the "Pirate," a four-cylinder inverted in-line engine of 90 horsepower. The fifty-hour test required by the Department of Commerce was successfully completed in December. The engine is rated by the Department of Commerce at 90 horsepower at 1,925 revolutions per minute. Commencing the first of February this engine was put in production in the recently enlarged Menasco plant at Los Angeles. This engine was developed under the leadership of A. S. Menasco, with an engineering staff headed by John Weisel. Previous to the Department of Commerce tests, a total of more than 1,000 hours of testing was done, practically all of which was at full throttle. The Menasco engine is noteworthy for its simplicity, light weight and clean appearance. A great amount of engineering work was done to develop this simplicity.

This simplicity has resulted in a light weight engine of 270 pounds without the sacrifice of strength in any of its members. Some idea of the ruggedness can be obtained from the fact that the crankshaft itself weighs forty pounds.

A good example is to be found in the timing gear arrangement which comprises but four stub tooth gears, three of which are of the same pitch and diameter. The unusual push rod arrangement, although not vertical, is another contributing factor to the clean lines. With the push rods placed between the cylinders, they are for the most part out of sight and are held at an even temperature, resulting in uniformity of expansion; and the resultant clearance is satisfactorily maintained during operation. This also permits the use of shorter camshafts than with the conventional arrangement. The real purpose behind this push rod disposition, however, was to obtain a fore and aft placement of the rocker arms so that free passage of air across all cylinder heads could be obtained. This at the same time permitted the use of a very large set of pompadour fins running from their extremity to the point in the cylinder head between the valves and around them where the greatest cooling efficiency can be obtained. In addition, extra large fin area has been provided over the entire cylinder head.

It was the aim of the Menasco engineers to provide a high factor of safety in cylinder cooling, since it was recognized that there would probably be installations in various airplanes such as the pusher type for which the then available in-line engine would not maintain a sufficiently low operating temperature. Having supplied one of these engines for the recently announced Northrop Flying Wing in a pusher installation, the company had an opportunity to test the soundness of its engineering. In this case, the engine was afforded very little in the way of air cooling while the ship was being warmed up or taxying across the field, as compared to the more conventional tractor type. The effect of the cylinder head cooling is directly transmitted to the entire engine. Actual tests have proved that they have achieved their purpose in this respect, for the logs of the Department of Commerce show an oil inlet temperature of 64 degrees Centrigrade and an outlet temperature of 45 degrees Centigrade. That the oil entered the engine at a higher temperature than was discharged is the result of the fact that three electric immersion heaters were kept in operation at all times during the fifty-hour run.

An air scoop is provided with the engine which directs the flow from the side of the cylinders, between them and out the rear. Oil is supplied from a reservoir by a gear driving pump operating at approximately forty pounds pressure. The engine operates on the dry sump principle and is supplied with two scavenger pumps which take the oil from the front end of the crankcase by means of an integral duct case and from the rear oil sump in the accessory case; it



Direct side and end views of the Menasco "Pirate" engine is then diverted through the intake manifold with the two-fold purpose of cooling the oil and providing a suitable means for heating the intake gases. From there it is returned to the reservoir, completing the circulation.

Two No. 201 Norma Hoffman ball bearings are used in each rocker arm. The rocker arm contact with the valve stem is supplied by a roller.

To offset possible criticism due to the angularity of the push rods, it is pointed out that this angularity is less than employed on several successful radial engines and that it is used only on the intake valve, where the least wear and stress is encountered. The crankshaft and connecting rod bearings are steel-backed and babbitt-lined. A forged I-beam alloy connecting rod is employed, in the piston end of which is fitted a nitroloid pin of one-inch diameter. A heavy rigid aluminum alloy piston is used which carries three compression rings above the pin with one oil scraper below.

Cylinder heads are cast aluminum alloy, the metal being more evenly distributed than usual to effect the proper distribution of head units. Special forged bronze valve seats are shrunk into these heads, the same material being employed for spark plug bushings and valve guides.

Automatic lubrication of the rocker arm mechanism is assured through the hollow push rods. The cylinders are of a nickel cast cross-grained iron, with long sleeves protruding into the crankcase which effect the baffling action and with an oil sump to insure proper and economical lubrication.

The crankcase is ribbed and trussed in girder fashion, and because of its small size a generous section is employed. Some idea of the compactness of this engine can be obtained from the fact that the crankcase at its widest point between the motor mounting pads measures 11⅛ inches. This is practically the widest point on the engine, with the exception of a slight increase to allow for the magnetos at the rear.

The crankshaft is provided with a No. 10 S. A. E. splined flange.

Provision was made for all accessories which the engine builder will, no doubt, be called upon to furnish. These include fuel pump mount, starter mount, the usual tachometer drive, adjustable oil by-pass, filter screen and drain plug. All accessories for the engine are mounted upon or in the rear accessory case, which may be removed by unscrewing thirteen nuts. When this is done all accessories, timing gears, oil pumps, magnetos, starter drive, tachometer drive, etc., are completely accessible for repair or maintenance.

Lifting lugs have been provided for the proper handling of the engine when removing it from the crate or from the airplane at times of overhauling.

All oil passages are either cord or lines cast in the case, reducing the possibility of oil line failure. Two breather caps are supplied on the top of the upper case and the entire projection upon the center line of the crankshaft is only 6 1/16 inches.

Ignition is supplied by two flange-mounted Scintilla magnetos. The Stromberg N. A. R.-3A carburetor used is placed immediately behind the rear cylinder.

One of the chief advantages of the inverted in-line engine is its ability to provide efficient carburetion which is evidenced by the horsepower obtained and the low fuel consumption. Oil consumption has likewise been reduced. This is due in a large measure to the natural advantage of the inverted engine which does not have crankcase dilution. This is evidenced to the laymen by the oil retaining its clear color after a good many hours of operation.

Specifications

Bore	4½ inches
Stroke	5⅛ inches
Displacement	326 cubic inches
Compression ratio	5.5 to 1
Rated power	90 horsepower at 1,925 r.p.m.
Fuel consumption	.53 lb. per b.h.p. per hour
Oil consumption	.010 pound per b.h.p. per hour
Total weight	270 pounds
Length overall	45½ inches
Height overall	28¼ inches
Width overall	13½ inches

STEARMAN BUSINESS SPEEDSTER

THE first public exhibition of the Stearman Model C3R, the Business Speedster, was held at the International Aircraft Show, St. Louis, Mo., February 15-23. The ship is a development of the Stearman Model C3B. Following the introduction of the new Wright Whirlwind J-6 series of aircraft engines, the Stearman company revised and improved Model C3B, replacing the J-5 Whirlwind, with which that model had been powered, with the Whirlwind 220 of the J-6 series which powers the newer model.

Included in the improvement in the design of the C3B and its development into the Business Speedster is a change in the lines of the fuselage to obtain better streamlining, and incorporated in the new design is a worm gear stabilizer of practical design. The pilot seat is adjustable, and all controls return automatically to neutral position when released. The passenger seats are padded over coiled springs and covered with Monochrome leather. Provision has been made for a large baggage compartment. Standard equipment includes a headrest, turn and bank indicator, air speed indicator, compass, tachometer, altimeter, and a standard Army Air Corps throttle.

The power plant is a Wright J-6 seven-cylinder 220-horsepower engine, driving a metal propeller. The center section of the upper wing is supported by N struts attached to the fuselage on each side of the front cockpit, which is directly under the upper wing. The flying wires extend from the upper wing to a point where a double brace from the fuselage is attached to the top section of the shock absorbers. The landing gear is the split-axle type. The shock unit employs the Stearman Rubber Draulic Gear, a hydraulic spring strut patented by the Stearman company. The tail skid is of the conventional type with a spoon type Stoodite plated shoe.

Specifications

Span, upper wing	35 feet
Span, lower wing	28 feet
Wing area	297 square feet
Lengh overall	24 feet
Height overall	9 feet
Tread	7 feet
Weight empty	1,741 pounds
Useful load	959 pounds
Pay load	328 pounds
Normal gross weight	2,700 pounds
Wing loading	9.38 pounds per sq. ft.
Power loading	12 pounds per sq. ft.
High speed	130 miles per hour
Cruising speed	110 miles per hour
Landing speed	41 miles per hour
Climb, sea level	1,000 ft. per minute
Service ceiling	18,000 feet

ELECTRIC HAMMER

THE Stanley-Ajax electric hammer is manufactured by the Stanley Electric Tool Company, a division of the Stanley Works, New Britain, Conn. The hammer is equipped throughout with ball bearings and all parts of the mechanism are made from special alloy steels. A patented device delivers blows to the cutting tool without the transmission of shock to the motor housing or the operator.

The three-place Stearman Business Speedster with Wright engine

TRAINING AIRCRAFT WELDERS

By R. W. Boggs and S. C. Clark

Engineers, Aircraft Service Division, Linde Air Products Co.

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WITHIN the past few years the aviation industry has made rapid and continued progress. It has grown from the early experimental stages to a point of recognition as a scientific and commercial success. The world has become air-minded to a degree far exceeding the predictions or expectations of even the most enthusiastic proponents of aviation of a decade ago. Each year the demand for planes has increased to such an extent that the production of airplanes today gives employment to thousands of men—each a skilled mechanic in his own field. More airplanes are now made in a month than were formerly produced in a year.

American manufacturers have been leaders in this expansion movement. They have been pace-makers in adopting the most modern and efficient methods and designs to promote their industry. Unquestionably one of the most important developments contributing to the success of aviation was the adoption of the all-steel fuselage. It is well known that the American aircraft industry has standardized on this type of construction; using oxwelded steel tubing for fuselages, landing gear and other parts. The most recent extension of this method of fabrication is in the construction of wings. This fact, coupled with the constantly increasing production of aircraft, has resulted in an ever increasing demand for trained oxy-acetylene welders capable of producing the high quality of work so essential in this field.

To meet this demand for trained operators, schools have been established by various individuals and aviation schools throughout the United States. Manufacturers also have set up training courses where chosen men are instructed in the applications of the oxy-acetylene process as related to the production of aircraft. It has been said that facilities for training welders should be considered a part of the equipment of every airplane manufacturing plant. In view of the excellent courses of instruction provided by some of the aircraft welding school not connected with any manufacturing interest, it is apparent that it is not always necessary for the manufacturer to provide his own course of instruction. The expense incurred in training is more than offset by the increased production efficiency and improved workmanship of welders trained in the particular operations of aircraft welding.

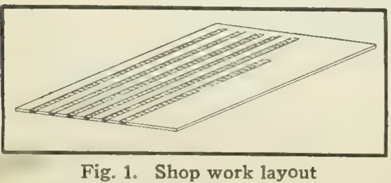

Fig. 1. Shop work layout (Lessons 1 to 3)

The scope of the course, whether it be given in the plant of a manufacturer or in an aircraft welding school, must be determined by the amount of time available and the type of work to be done. Concentration on a single production operation will, of course, permit teaching the student in shorter time than would a thorough course covering all aspects of the oxy-acetylene process as applied to aircraft construction. Most manufacturing plants will find it helpful to have several welders in training at all times so that there will always be someone to step into the place of any welder who for any reason is unable to proceed with his work. This also provides the plant with skilled men in case of heavy production or expansion activities.

Experience in other industries having shown that the application of "procedure control" principles insures welded construction of highest quality, it is natural that procedure control was adopted by the aircraft industry since quality is a prime requisite. Training welders in accordance with these proved principles will produce welders most capable of meeting the demands of the aircraft industry.

This article outlines a training course for aircraft welders based on procedure control. Obviously the instructor in charge of such a course should be thoroughly familiar with all phases of procedure control, as well as with actual factory operations and other technical features of aircraft production. The course is given in lesson form, giving an outline of the lecture material, demonstrations and shop work for each of the lessons.

Lesson 1

Lecture—(1) Oxy-acetylene process for welding and cutting metals. Fundamental principles, development, industrial importance. Oxygen and acetylene. (2) Functions of apparatus. Brief description of blowpipes and regulators by means of cross-section drawings. (3) Precautions and safe practices. Opening valves, adjusting regulators, blowing out hose, why hose is of different colors.

Demonstration—(1) Set up of equipment, adjusting regulators, lightings, adjusting and extinguishing flame. (2) Effects of neutral, carbonizing (excess acetylene), and oxidizing flames on steel plate. (3) Proper method of making ripple weld on flat plate without rod.

Shop Work—The student should practice setting up equipment, adjusting regulators, lighting, adjusting, and extinguishing blowpipe flame as in the demonstration. Using pieces of 22 to 16 gauge sheet steel, study effects of neutral, excess acetylene, and oxidizing flames on steel. On pieces of sheet steel, slightly inclined as in Fig. 1, make forward ripple welds without rod.

Reference Reading—Oxwelder's Manual, Chapter 1, 2, 3, 4, 5, and 26. Safe Practice Bulletin No. 23, published by the National Safety Council. Regulations of the National Board of Fire Underwriters.

Lesson 2

Lecture—Blowpipes (low pressure and pressure types). Principles, construction, care of tips, valves and hose.

Demonstration—(1) Proper cleaning of tips. (2) Making and inspecting hose connections. (3) Splicing hose.

Shop Work—Continue practice in making forward ripple welds without rod as in Lesson 1 and Fig. 1.

Reference Reading—Oxwelder's Manual, Chapter 5 and 7.

Lesson 3

Lecture—(1) Regulators, different types and their construction. Care of regulators and minor repairs. (2) Function of welding rod. Carrying a puddle, using rod. Forward and backward welding.

Demonstration—(1) Assembly of regulators. (2) Making forward ripple welds on steel plate with rod. Making forward and backward fillet welds with rod.

Shop Work—After further practice in making forward ripple welds without rod, the student should practice making the same type of weld using welding rod.

Reference Reading—Oxwelder's Manual, Chapters 6, 10, 26.

Lesson 4

Lecture—(1) Oxygen. Production, cylinders, precautions in handling. (2) Acetylene. Methods of generating, safe pressure. Reason for combining with acetone in cylinders, precautions in handling. (3) Generators, types.

Demonstration—Charging of generator—if one is available.

Shop Work—Using pieces of 22 to 16 gauge sheet steel slotted as shown in Fig. 2, make forward ripple butt welds with rod. Test occasional welds for penetration by bending in vise.

Reference Reading—Oxwelder's Manual, Chapters 2, 26. "Calcium Carbide and Acetylene," by G. G. Pond.

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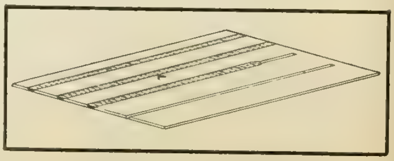

Fig. 2. Shop work layout (Lessons 4 and 5)

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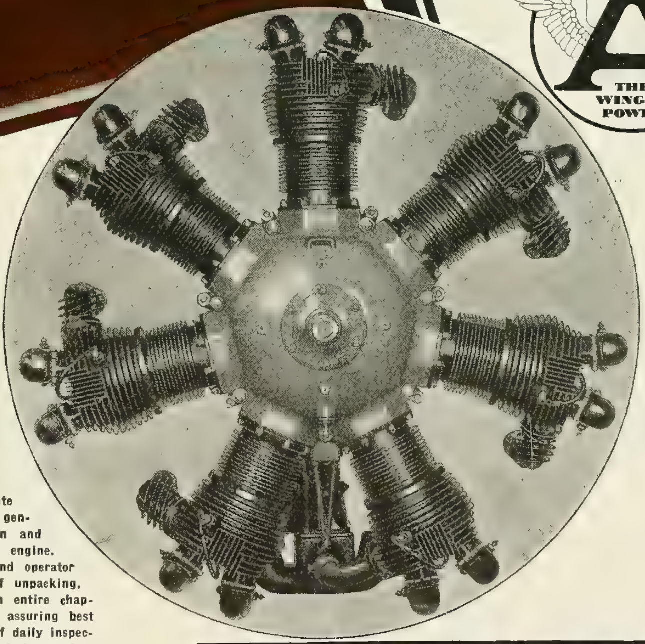

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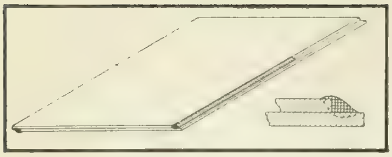

Fig. 3. Shopwork layout (Lesson 6)

(Continued from preceding page)

Lesson 5

Lecture—Cutting. Difference between cutting and welding blowpipes. Spontaneous burning of red hot iron or steel in oxygen. Reason for the heating flames. Starting and maintaining a cut.

Demonstration—Burn welding rod in oxygen to show principle of cutting. Cutting with blowpipe.

Shop Work—Cutting steel plate. Continue making forward ripple butt welds as in Lesson 4, testing occasional welds by bending.

Reference Reading—Oxwelder's Manual, Chapter 8.

Lesson 6

Lecture—Review of past week's lectures, with stress on Lecture 1.

Shop Work—Lap two pieces of 22 to 16 gauge sheet steel, as shown in Fig. 3. Make forward and backward fillet welds along both lapped edges using rod, cut welds off plate and repeat. As the student acquires proficiency, strips 1-inch wide, containing a weld, should be cut into 1-inch squares and the welds tested for penetration by forcing plates apart.

Lesson 7

Lecture—(1) Metallurgy of low carbon steel, mild steel and chrome-molybdenum steel, their chemical and physical properties. (2) Tests for recognition of the different grades. (3) Importance of high quality welding rod of proper grade.

Demonstration—Show how to distinguish between different grades of steel discussed in lecture, by welding, melting, etc.

Shop Work—Repeat shop work in Lesson 6. Set up and tack two pieces of 22 to 16 gauge sheet steel, as shown in Fig. 4, with one plate vertical. The position of the other plate should vary from horizontal to vertical in the series of specimens welded by the student. Make forward corner welds without rod and with rod. Test occasional welds for penetration by bending.

Reference Reading—Oxwelder's Manual, Chapter 9.

Lesson 8

Lecture—Significance of carbon content of steel. Effect of other than neutral flames on the puddle and finished weld. Overheating of puddle and adjacent base metal. Effect of heat on chrome-molybdenum steel. Desirability of using a moderate flame and making as small a weld as consistent with maximum strength, to prevent overheating of chrome-molybdenum base metal.

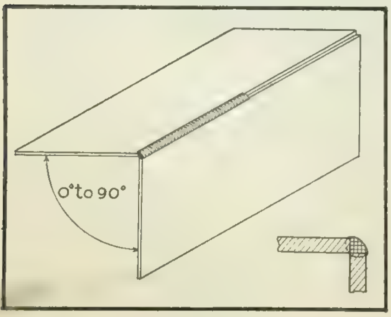

Fig. 4. Shop work layout (Lesson 7)

Demonstration—Welding the different grades of steel, showing results of improper flame adjustment and overheating.

Shop Work—Make forward butt and fillet welds with rod as in Lessons 4 to 6, except that the sheet being welded should be supported so as to form an angle with the surface of the welding table varying from 0 to 45 degrees, for the series of specimens welded during this shop work period. This is indicated in Fig. 5.

Reference Reading—Oxwelder's Manual. Chapter 10.

Lesson 9

Lecture—Good welding technique and character of satisfactory welds. Cleaning edges to be welded of scale, etc. Spacing of joints and tacking, when required. Fusion, size and contour of weld, penetration to root of fillet and to inner side of butt weld. Importance of smooth fillet at junction of weld and base metal. Remelting tack welds and remelting when tying into a previously made weld.

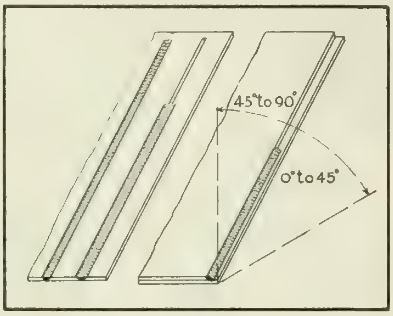

Fig. 5. Shop work layout (Lessons 8 and 9)

Demonstration—Welding tee and lattice joints of tubing, illustrating points in lecture.

Shop Work—Continue the shop work of Lesson 8 with the sheets set at angles varying from 45 to 90 degrees, as indicated in Fig. 5. Occasional welds should be tested as was done in previous lessons.

Reference Reading—Oxwelder's Manual, Chapter 10.

Lesson 10

Lecture—Theoretical discussion of fuselage joints, tensile and compressive members. Why center lines should intersect at a common point. Why gusset plates, insert plates and fish mouth joints are used.

Demonstration—Show typical joints on board and discuss character of stresses.

Shop Work—Set up and tack a 1-inch strip of sheet steel at right angles to the surface of a larger piece of the same material, as shown in Fig. 6. Make forward and backward fillet welds along both sides of the strip. Repeat, varying the angle at which the strip is set on the plate and also the angle which the base plate makes with the surface of the welding table as shown in Fig. 6.

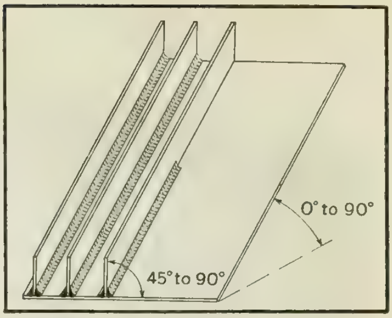

Fig. 6. Shop work layout (Lesson 10)

Lesson 11

Lecture—Various methods of testing welds, by bending from both sides, fracturing through weld, tensile test, crushing test, etching polished cross-sections, remelting completed welds.

Design and use of jigs and fixtures. Taking care of expansion and contraction.

Demonstration—Test welds by all above methods for which facilities are available. Show how tubes and joints may be distorted by heat and methods of controlling distortion.

Shop Work—For this and subsequent lessons requiring the use of tubing, the following materials should be used; mild steel tubing. Army and Navy Specification 57-180-1A or S.A.E. 1025; chrome-molybdenum tubing, Army and Navy Specification 57-180-2A or S.A.E. 4130X. Tubing sizes should vary from ¾ to 2 inches, the corresponding wall thickness varying from 0.028-inch to 0.065 inch.

As shown in Figure 7, make longitudinal welds using rod on the surface of tubing inclined from horizontal to vertical position. Make rotating and position welds using rod on surface of tubing inclined from horizontal to vertical. These welds may be made in a continuous spiral, if desired. Make open butt welds of the rotating and position types on pieces of tubing lined up and tacked, as shown at the right in Figure 7.

Test open butt welds occasionally for fusion, penetration, and size by etching cross-section.

Lesson 12

Lecture—Review of past week's lectures with stress on 8 and 9.

Shop Work—Set pieces of tubing perpendicular to a piece of 22 to 16 gauge sheet steel as shown in Figure 8. Make forward and backward fillet welds joining tubing to plate. Test occasional welds by remelting

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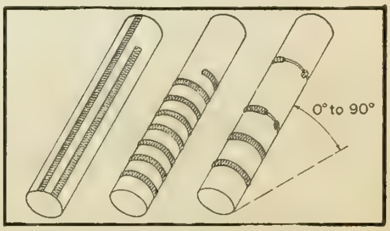
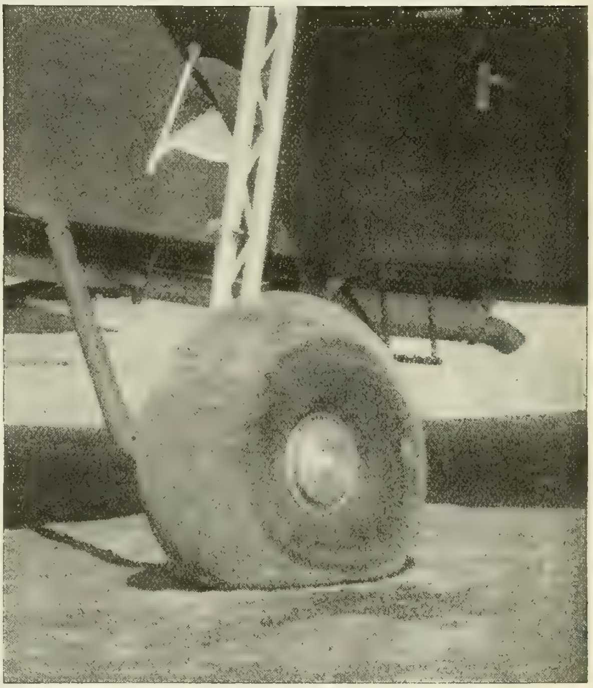


Fig. 7. Shop work layout (Lesson 11)

SEE IN THIS UNRETOUCHED PHOTOGRAPH **HOW . . .**

AIRWHEELS

bring new safety to LANDINGS!

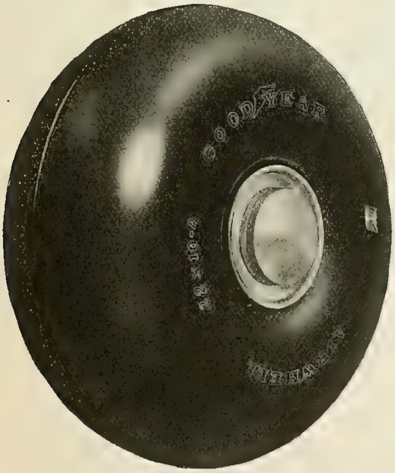


Here is one of these great, tough, soft, rolling cushions of rubber—just as it looks on the landing field. The new wheel and tire combined, known as the Goodyear Airwheel.

You can see the dirt still on it—and in the breadth which that dirt covers, you can see how much of the Airwheel spreads out in contact with the ground.

No wonder planes fitted with Airwheels can land in safety on plowed ground—on sand—in snow—on wet, soggy fields! No wonder, even on rough ground, the plane takes off and lands so gently that the pilot hardly realizes when he touches earth or leaves it.

Airwheels require only 5 to 15 pounds pressure. They mount directly on special hubs, also made by Goodyear. They have internal, self-centering brakes, which give the most desirable brake action so far devised. Repeated landing tests, with one or both Airwheels deflated, have shown that they are at least as safe as other tires—and they cannot jump from the hub and tangle in the landing gear. With Airwheels, it is almost impossible to drag a wing in a ground loop, even when you try to do it. And wind tunnel tests show their streamline shape in most cases causes less wind resistance.



Airwheels now are made for ships weighing 1,000 to 20,000 pounds. For information or engineering assistance in equipping your future ships, write Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.

GOODYEAR

EVERYTHING IN RUBBER FOR THE AIRPLANE

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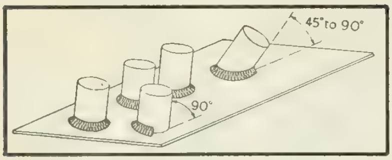


Fig. 8. Shop work layout (Lesson 12)

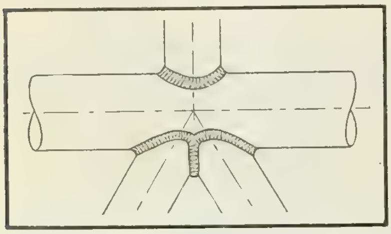


Fig. 9. Shop work layout (Lesson 15)

weld metal to determine soundness, fusion and penetration.

Lesson 13

Lecture—Line up of fuselage, landing gears, tail surfaces, motor mounts, etc.

Demonstration—Demonstrate according to lecture.

Shop Work—Continue Lesson 12 with the tubing set at angles varying from perpendicular to 45 degrees, as shown at the right in Figure 8. Make forward and backward fillet welds. Test occasional welds by remelting.

Lesson 14

Lecture—Bronze-welding. Welding aluminum, stainless steels, etc.

Demonstration—Show use of flux in welding as discussed on lecture.

Shop Work—Repeat the shop work in Lessons 12 and 13 with the plate in vertical position.

Reference Reading — Oxwelder's Manual, Chapters 17, 18, 19 and 20.

Lesson 15

Lecture—Airplanes in general. Factory production methods. Simple aerodynamics.

Shop Work—Continue welding tubing to plate making position welds. Preparation, set up, tacking and welding of tee and lattice joints with tubing. Figure nine is a typical joint. Make forward and backward welds with main section of tubing horizontal on table. Test occasional welds by remelting weld metal and by etching cross-sections to determine soundness, fusion and penetration.

Lessons 16 to 20

Lectures—Repeat Lectures 1 to 5.

Shop Work—Continue work outlined in Lessons 14 and 15.

Lesson 21

Lecture—Repeat Lecture 6.

Shop Work—Make overhead welds without rod on steel sheet. With sheets prepared as in Figure 2, make overhead welds with rod. With sheet prepared in the same way, make forward and backward welds with rod with the plate vertical and the slots horizontal. Test occasional welds for penetration by bending in vise.

Lesson 22

Lecture—Repeat Lecture 7.

Shop Work—With tubing prepared as in Figure 7 and as in Figure 9, make overhead welds within axes of all tubes horizontal. Test occasional welds by remelting weld metal and by etching cross-section to determine soundness, fusion and penetration.

Lessons 23 to 27

Lectures—Repeat Lectures 8 to 12.

Shop Work—Prepare joints as shown in Figure 10 and as more complicated joints in a fuselage are constructed. Make welds in the position in which joints would be located in regular production work. Test occasional welds by remelting weld metal, particularly where they were started and closed out. Also etch cross-section to determine soundness, fusion and penetration.

Lesson 28

Lecture—Repeat Lecture 13.

Shop Work—Preparation and welding test specimens to pass qualification test. Specifications for preparation, welding and testing of specimens shown in Figures 11 to 17.

Lesson 29

Lecture—Repeat Lecture 14.

Shop Work—Special coaching and retesting in cases of failure in Lesson 28. Otherwise, welding on regular fuselage.

Lesson 30

Lecture—Repeat Lecture 15.

Shop Work—Welding on regular fuselage.

QUALIFICATION TESTS FOR AIRCRAFT WELDERS

The following tests should be passed by a welder before he is allowed to weld upon aircraft structures. Preliminary tests may be omitted at the option of the inspector (welding foreman or instructor), if the welder or student has previously been under observation. Failure to pass the preliminary tests satisfactorily should eliminate the welder from further consideration and save the time and expense of the final tests.

MATERIAL

(57-180-1A)
Mild Steel (S.A.E. 1025)
(57-180-2A)
Chrome-Molybdenum Steel (S.A.E. 4130X)
Sizes as shown in figures.
Welding Rod—Oxweld No. 7.

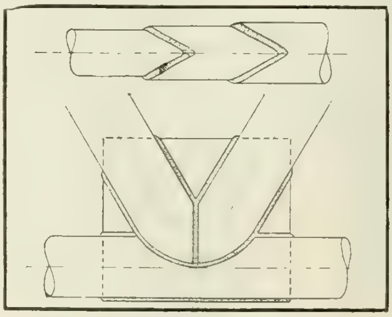


Fig. 10. Shop work layout
(Lessons 23 to 27)

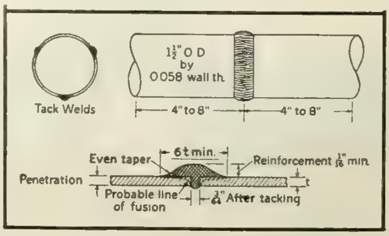
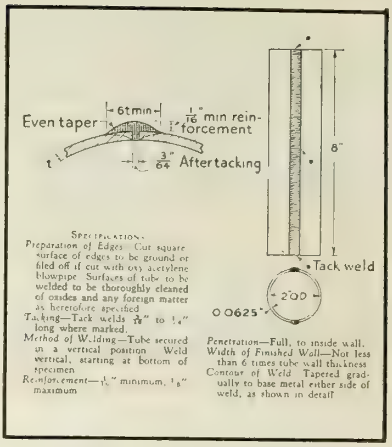

Tack Welds
1½" O D by 0.058 wall th.
4" to 8"
4" to 8"
Even taper
6t min.
Reinforcement $\frac{1}{16}$" min.
Penetration
t
Probable line of fusion
$\frac{3}{64}$" After tacking

Fig. 11. Open butt weld test


Even taper
6t min
$\frac{1}{16}$" min reinforcement
t
$\frac{3}{64}$" After tacking
8"
Tack weld
2" OD
0.0625"

SPECIFICATIONS

Preparation of Edges—Cut square surface of edges to be ground or filed off if cut with oxy acetylene blowpipe. Surfaces of tube to be welded to be thoroughly cleaned of oxides and any foreign matter as heretofore specified.

Tacking—Tack welds $\frac{3}{16}$" to ¼" long where marked.

Method of Welding—Tube secured in a vertical position. Weld vertical, starting at bottom of specimen.

Reinforcement—$\frac{1}{16}$" minimum, ⅛" maximum.

Penetration—Full, to inside wall.

Width of Finished Wall—Not less than 6 times tube wall thickness.

Contour of Weld—Tapered gradually to base metal either side of weld, as shown in detail.

Fig. 12. Position butt weld test

Preliminary Tests

(1) *Rotative Butt Welds* — Welder to make an open butt weld joining two short sections of tubing for each of the two grades of steel specified herein. The designs and specifications for this test specimen are given in Figure 11.

(2) *Position Butt Welds* — Welder to make an open butt vertical weld joining two sections of 2-inch tubing in either of the two grades of steel specified herein. The designs and specifications for this test are given in Figure 12.

(3) *Horizontal Fillet Welds*—Welder to make a fillet welded specimen, joining a 3/16-inch plate to a 1½-inch tube section in either one of the two grades of steel specified herein. The design and specifications for this test specimen are given in Figure 13.

Before welding the material should be thoroughly cleaned in the regions of welding, of all oxides or any foreign matter.

Cleaning can be done either with a stiff wire brush, a file or emery paper, or by grinding if necessary.

Welder to select tip and determine gas pressures.

Welder to weld one fillet forward and one backward.

Welder to select welding rod size.

The welding inspector should, during the welding operations, look for the following factors of manual skill of the welder and shall determine whether he has sufficient skill to proceed with the final qualification tests.

(a) A clean welding tip.

(b) Soft neutral welding flame, neither pointed nor irregular.

(c) Penetration to inside wall of tube, or to points "X" and to see if welder permits excessive weld metal to protrude into the tube.

(d) "Floating out" of oxides or any dirt in the weld puddle.

(e) Even fusion into the base metal.

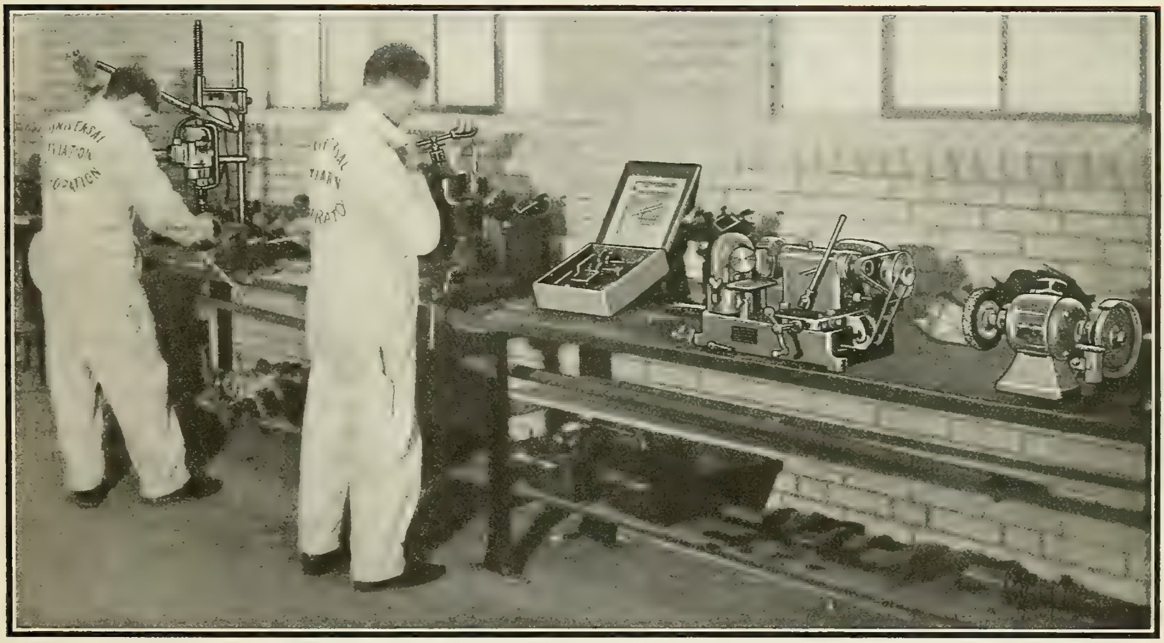
(f) Regular movement of the blowpipe.

(g) Occasional check for neutral flame, by throttling back to neutral indication, a momentary excess of acetylene.

(h) Uniform incorporation of filler material with the progressing weld puddle.

(*Continued on next page*)

Universal Aviation Schools
use "Van Dorn" Aircraft Electric Tools

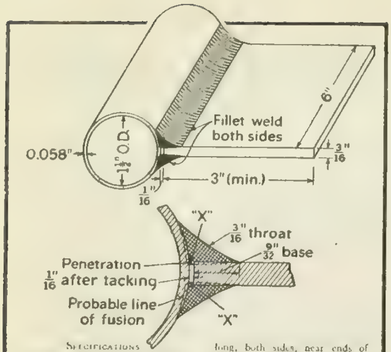


STUDENTS of the Universal Aviation School receive a thorough knowledge of the functioning of airplane engines in the classrooms and practical experience in overhauling engines and the use of properly designed tools for each job.

It is, therefore, significant that when they do their valve jobs a Van Dorn Self-Centering Aircraft Pilot and Cutter is used for refacing the valve seats quickly and accurately and in alignment with the guide. The valves are refaced with a Van Dorn Valve Refacer which is supplied with collets suitable for aircraft valves with short stems. These tools produce a precision job and insure better engine performance.

Other Van Dorn Electric Tools used in their shops include Drills, Drill Stands, Bench Grinders, etc., to do the many jobs requiring such tools.

The Van Dorn Electric Tool Company, Cleveland, Ohio



Specifications

Preparation—Edge of plate abutting tube to have square cut. Surface of edge to be ground or filed off if cut with oxy acetylene blowpipe. Surfaces of tube and plate to be welded to be thoroughly cleaned of oxides and any foreign matter as heretofore specified.

Tacking—Tack welds 3/16" to 1/4" long, both sides, near ends of plate.

Method of Welding—Tube clamped to table so welds can be made in a horizontal position.

Dimensions of Weld—As shown in detail. Fillet contour to taper gradually at either side of weld.

Penetration—To the root of the fillet or to point "X".

Fig. 13. Fillet weld test

(Continued from preceding page)

(i) Production of a regular weld contour and proper tapering of the weld along the sides in acordance with the sketches in Figures 11, 12 or 13.

(j) Maintenance of clean, molten metal at all times during the welding operation.

(k) Proper incorporation of the tack welds into the final weld, particularly the fusion at such points.

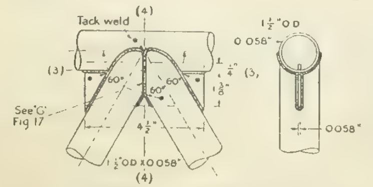
(l) Proper "closing out" of weld at finish where the progressing weld engages the start of the weld, where care should be exercised on the part of the welder to see that the finish of the weld is thoroughly penetrated into the previously made weld.

The fillet welds in specimen Figure 13 are to be remelted by aid of a suitable welding flame, to expose the character of the weld such as its fusion, penetration and the general density of the deposited metal.

Final Qualification Test

If the welder has satisfactorily passed the Preliminary Tests set out above, he should next be required to pass the following final qualification tests.

(4) *Open Butt Collapsing Test* (Rotative and Vertical Position Welding). This test requires the welding of three specimens similar to Figure 14 in either of the two grades of steel specified. Two of the three specimens should be rotated during the welding operations for the convenience of welder, the specimens being at all times horizontal with respect to the longitudinal axis. The welding should be done in accordance with the specifications accompanying Figure 14.



Specifications

Preparation of Joints—Intersections to be carefully matched. Surfaces to be welded including surfaces inside joints, to be thoroughly cleaned of oxides and any foreign matter as heretofore specified.

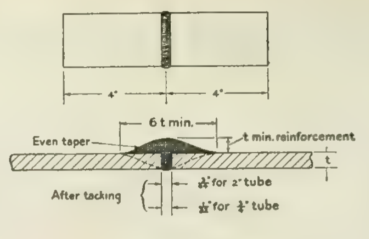
Tacking—Tack welds 3/16" to 1/4" long where marked.

Method of Welding—Specimen to be welded in fixed position, insert plate vertical with principal member uppermost. Welding to be done forward or backward. Backward is recommended.

Penetration—To the root of fillet.

Contour of Weld—Tapered gradually to base metal either side of weld.

Fig. 16. Composite joint



Specifications

Preparation of Ends—Cut square. Surfaces of tubes to be welded including surfaces inside joint, to be thoroughly cleaned of oxides and any foreign matter as heretofore specified.

Tacking—Tack welds 1/8" to 1/4" long at three or more equidistant points.

Method of Welding—Two specimens to be rotated during welding, tube to be horizontal. One specimen to be welded in a vertical, fixed position. Welding to be done forward or backward. Backward is recommended.

Reinforcement—Wall thickness minimum, 1/8" maximum.

Penetration—Full, to inside wall.

Width of Finished Weld—Not less than 6 times tube wall thickness.

Contour of Weld—Tapered gradually to base metal either side of weld.

Fig. 14. Open butt collapsing test

To test the three specimens, crush between the jaws of a vise or parallel faced heads of a press until reduced to one-half the original diameter. Any test weld in aircraft tubing that is cracked by this treatment should be considered unsatisfactory.

(5) *Insert Plate Joint. Fillet Weld Test* (Horizontal Welding). This test requires the welding of one specimen similar to Figure 15, in either of the grades of steel specified herein. The specifications accompanying Figure 15 inform the welder of the welding requirements governing this test specimen. Upon completion of welding, the specimen shall be cut in sections at points 1½ inches from the front and back edges of the specimen, Figure 15. The surfaces of these sections (one for each section exposed) should be prepared for macro-etching as recommended below.

The prepared surfaces in the zone of the welds shall be inspected for the following factors:

(a) Conformity of dimensions of welds to those given in Figure 15.

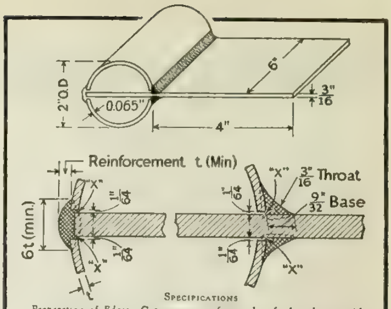
(b) Penetration of Welds — Fillet welds shall have full penetration to the points marked *X*. The tee butt weld shall have full penetration to the points marked *X*.

(c) *Fusion*—The several welds shall be uniformly and completely fused to the base metal at all points of contact.

(d) Sound weld metal, free from gas pockets or holes, fissures, plates or oxides, laps or similar defects.

(6) *Composite Joint* (General Position Welding). This test is specified for the purpose of observing the welder's ability to weld a typical four-member reinforced joint for aircraft and in a position characteristic to that of production practices. The design and specifications are given in Figure 16.

The nature of the design and the position of the specimen for welding requires the welder to make welds in several unhandy positions, also to super-impose welds upon previously made welds. His ability to produce a satisfactory welded joint under these conditions can be thus determined.



Specifications

Preparation of Edges—Cut square. Surfaces to be welded including surface inside joints to be thoroughly cleaned of oxides and any foreign matter as heretofore specified.

Tacking—Four tack welds, two each side, near end of plate at point of fillet welds and two tack welds near ends of plate at point of butt weld.

Method of Welding—Specimen to be placed in convenient position for each of the three welds. Welding is to be done forward or backward. Backward is recommended.

Reinforcement—As shown for fillets. For the butt weld, wall thickness minimum, 1/8" maximum.

Width of Finished Welds—As shown.

Contour of Weld—Tapered gradually to base metal either side of weld.

Fig. 15. Insert plate joint test

Upon completion of welding, sections through the specimens shall be exposed through the center of the welds, (sections (3)—(3) and (4)—(4) Figure 16), by sawing and be prepared for macro-etching as recommended below.

The prepared surfaces in the zone of the welds shall be inspected similarly as for the Fillet Weld Test, especial attention being given to the locations where compound or rewelding has been done.

Macro-Etching

The specimens for macro-etching are prepared by grinding or filing until the surface is flat. Then the grinding or polishing should be continued on successively finer abrasive wheels or grades of emery paper. Each grinding should remove the scratches left by the previously used coarser wheels. The final polishing should be with No. 1 emery paper.

A saturated solution of ammonium persulphate should be used for the etching. It may be supplied with a small cloth or wad of cotton. When the etching is finished, hold the specimen under running water and rub with a cloth or cotton, then wash with alcohol and dry quickly.

The etched specimen may be inspected for the following:

Thoroughness of penetration of the welding.

Contour of weld.

Fusion between weld metal and base metal.

Freedom from cold shuts, blowholes and non-metallic inclusions.

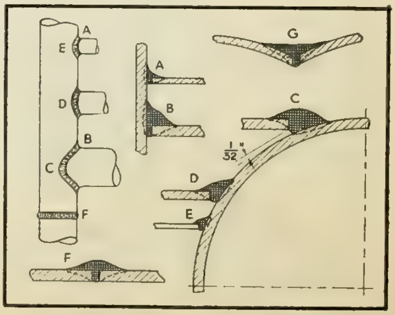
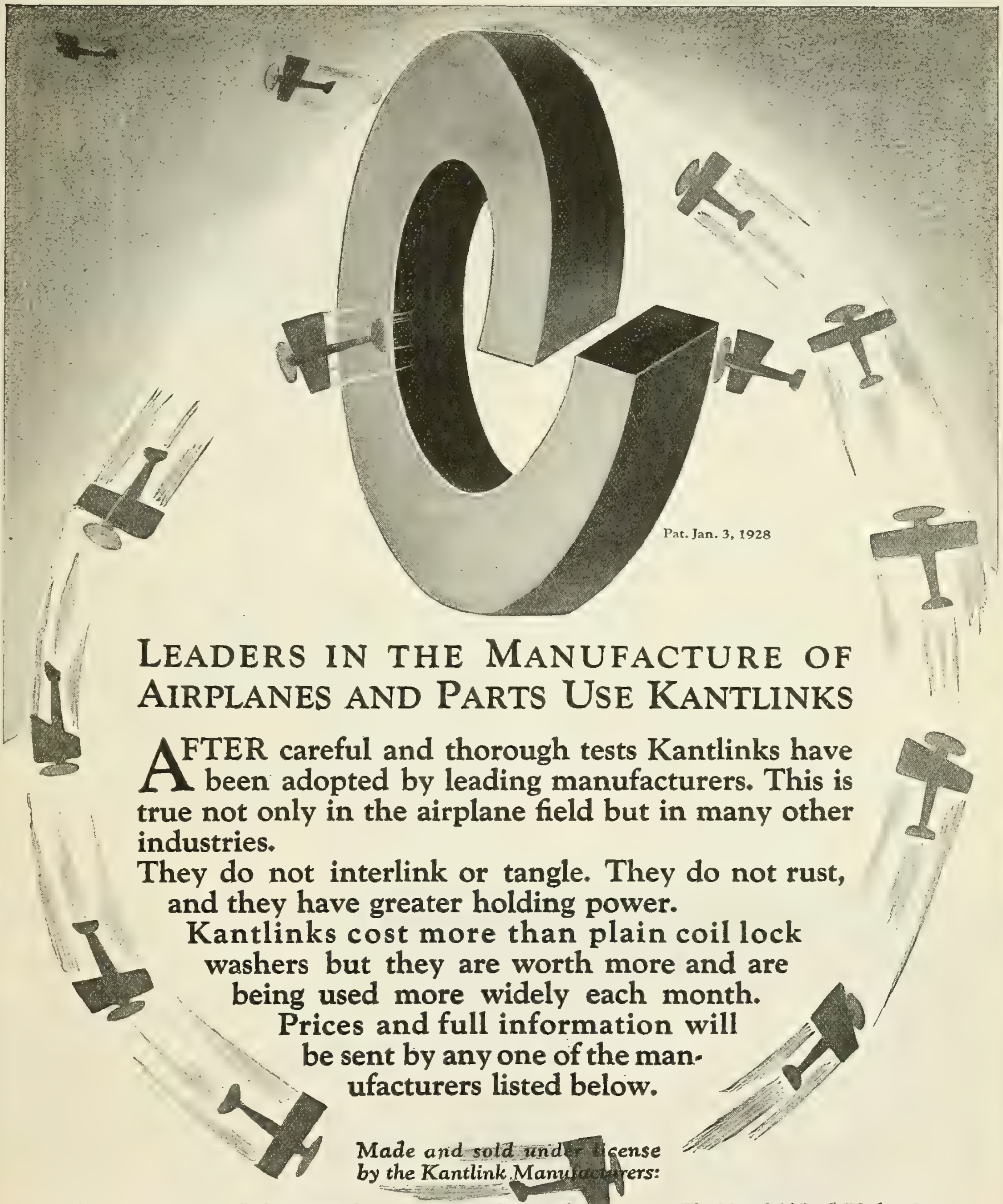


Fig. 17. Details of test welds



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AFTER careful and thorough tests Kantlinks have been adopted by leading manufacturers. This is true not only in the airplane field but in many other industries.

They do not interlink or tangle. They do not rust, and they have greater holding power.

Kantlinks cost more than plain coil lock washers but they are worth more and are being used more widely each month. Prices and full information will be sent by any one of the manufacturers listed below.

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The National Lock Washer Co.
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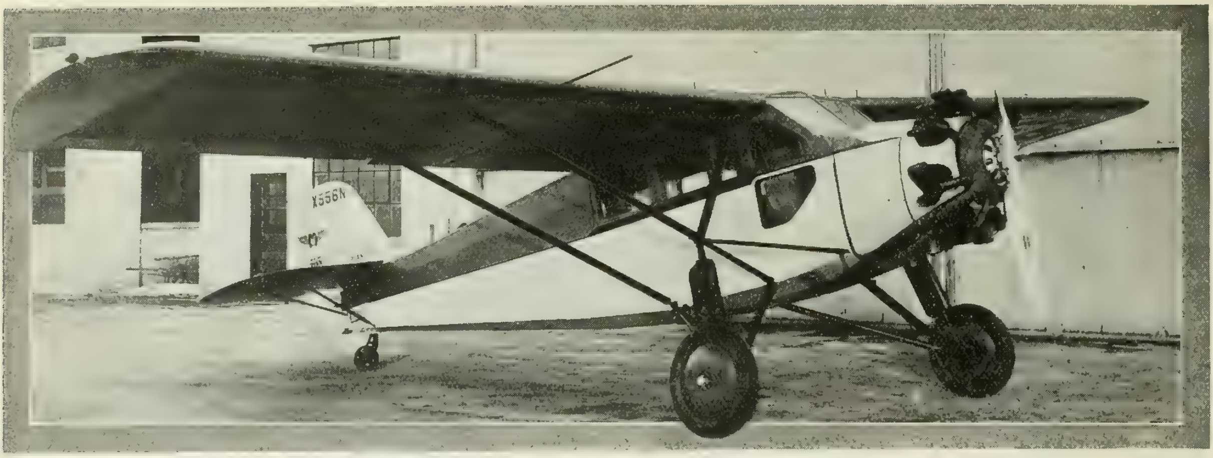
DO NOT TANGLE DO NOT RUST

THEY PAY THEIR ENTIRE COST IN TIME SAVED - SOMETIMES EVEN MORE



RYAN "FOURSOME"

THE new Ryan Foursome was designed for the use of business houses, sportsmen, and private owners. It incorporates several new features both in technical design and arrangement of the cabin. To provide comfort and convenience similar to that of a limousine, private yacht or pullman car, the plane has been built to give an unusual amount of room in the cabin, and special attention has been paid to the upholstery and arrangement of the seats.

The back of the front seat folds down, joining the seat behind and forming a lounge. The other seats are all adjustable to several reclining positions, and the pilot's seat may be regulated to the easiest control position. All seats are deeply upholstered. Care has been taken in selecting distinctive durable upholstery materials, with trimmings and carpets to match. The upholstery and seat cushions are red. The cabin is furnished with such accessories as ash trays, match holders, window curtains and cabin lights.

Non-shatterable glass is used throughout, and the large opening windows give a wide range of vision to both passengers and pilot. Other equipment includes a special oil cooler, shock absorbers, and a complete indirectly lighted instrument board.

A new control system has been designed for the Foursome. No cables or other control mechanism are above the floor, giving a clean appearance to the cabin. The second stick for instruction purposes may be inserted. The elevator is operated by means of a positive push-pull control mechanism acting inside the fin. Ample bearing surfaces and Alemite lubrication fittings are provided for all moving parts. A new type stabilizer adjustment, operating on a fine tooth ratchet, allows balancing of plane for various loading conditions. For greater ease of operation, a bell crank is used entirely enclosed within the fuselage. The aileron cables operate on ball bearing pulleys with sufficient leverage to give ease of control and a sensitive stick.

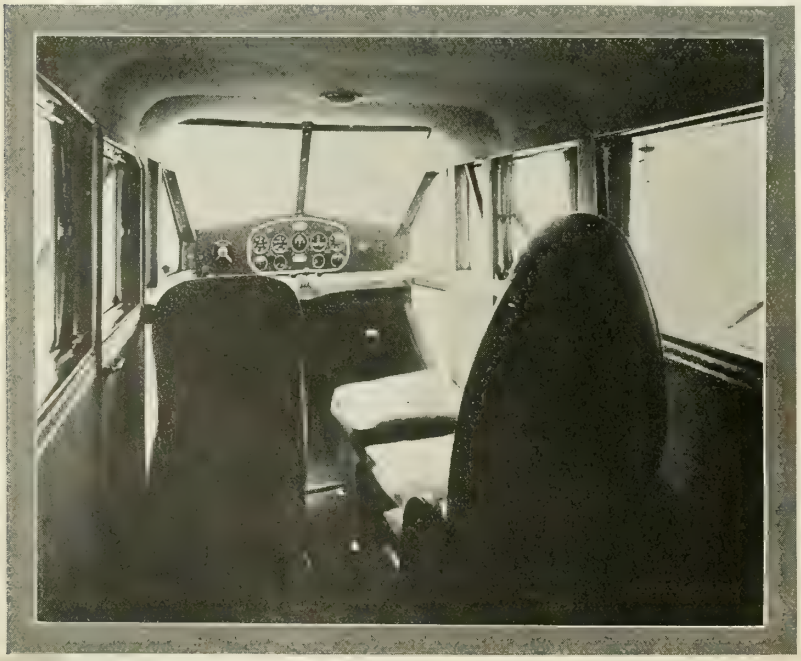
The rudder is operated by automobile type pedals of new design. The brake pedals are conveniently located just above the rudder controls, and operate with a toe pressure.

Inspection plates and water-tight zipper openings are provided for inspection and lubrication of all moving parts.

The wing is made in two panels for greater ease in handling. Steel, cadmium plated ribs are used throughout, in conjunction with steel tie rods and dural section compression members. The leading edge is covered with mahogany plywood back to the front spars.

The fuselage is built of chrome-molybdenum steel tubing so engineered that no bracing is required in the cabin. All welding is done in jigs.

The standard model is equipped with the J-6 seven-cylinder Wright Whirlwind engine, but is stressed to carry any other power plant up to 300 horsepower, including the Wasp Junior and the Wright J-6 nine-cylinder. It is said that, in smooth air, the plane will hold a compass course for some time without touching the controls.

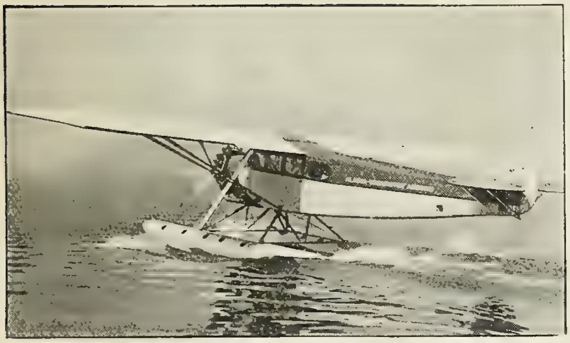


Interior of the Ryan "Foursome" Model C-1 monoplane

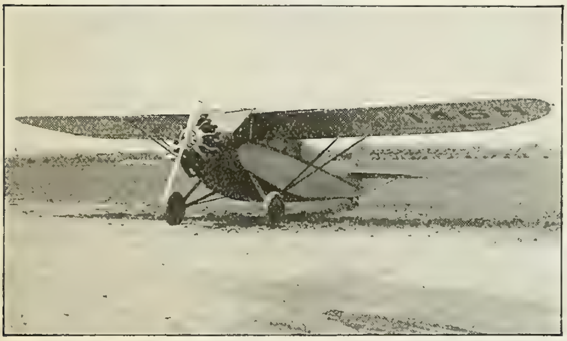
Specifications

Span	39 feet 3 inches
Length overall	28 feet
Height overall	9 feet 9 inches
Gross weight	3,300 pounds
Disposable load	1,300 pounds
Weight empty	2,000 pounds
Payload	600 pounds
Wing area	220 square feet
Wing loading	15.0 pounds per square foot
Power loading	14.6 pounds per horsepower
High speed	130 miles per hour
Cruising speed (1,750 r.p.m.)	110 m.p.h.
Landing speed	55 miles per hour
Service ceiling	16,000 feet
Absolute ceiling	22,000 feet
Rate of climb	900 feet per minute
Take-off distance	300 feet
Landing distance	200 feet
Cruising range	625 miles

The FAIRCHILD FRANCHISE brings you *every business help*



A. T. C. 89. FAIRCHILD 71. Seven-place transport. With 420 h.p. Wasp engine. Inertia starter, cabin heater, folding wings. Equipped with either wheels, pontoons or skiis. Seaplane top speed 129 m.p.h., climb 650 feet per minute, service ceiling 15,000 feet, cruising range 650 miles. Price, seaplane, $22,400 flyaway Farmingdale.



A. T. C. 242. FAIRCHILD 42 Custom Foursome, for business executives and sportsmen. Equipped with Wright J-6 300 h.p. engine. Dual controls. Inertia starter. Folding wings. Top speed 130 m.p.h., climb 600 feet per minute, service ceiling 15,300 feet. Price $12,900 flyaway Farmingdale.

Holders of the Fairchild Franchise become members of the Fairchild Organization, and entitled to all the unique benefits to be obtained from the Fairchild experts in every branch of the aviation industry. That is why this Franchise possesses such unusual value, over and above that inherent in the Full Line of Fairchild Airplanes themselves. The merchandise meets every flying need; Fairchild merchandising assistance solves every business problem.

Fairchild Representatives are not mere salesmen. They are business counselors, capable of assisting you in cultivating to best advantage the opportunities offered by your exclusive territory. They can help greatly in finding new prospects; closing sales to difficult buyers; establishing taxi, transport, school, photographic and club activities. Even in such things as insurance, bookkeeping and accounting, and finance, these men will be found invaluable. Through them everything Fairchild has will be made available to you, including the floor finance plan.

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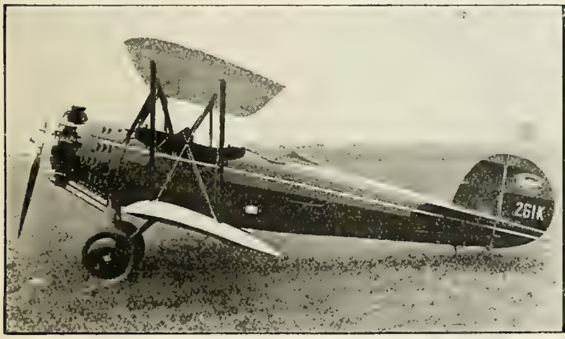
Farmingdale, Long Island, New York

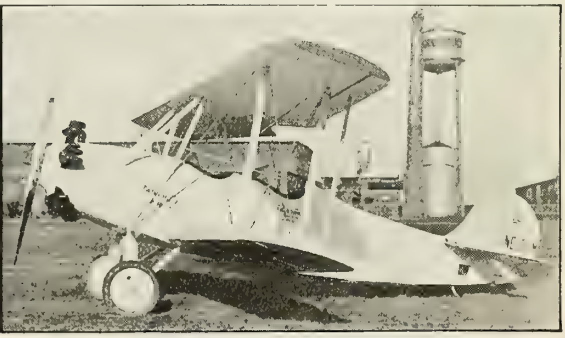
Plants: Farmingdale, N. Y.; Hagerstown, Md.; Longueuil, P. Q., Canada

Export Offices: 122 East 42nd Street, New York City

Division of the Aviation Corporation



A. T. C. 162. FAIRCHILD KR-34. Three place, for training, taxi and sport. With Wright J-6 165 h.p. engine. Top speed 123 m.p.h., climb 800 feet per minute, service ceiling 14,100 feet. Price $6,575 flyaway Hagerstown, Md.



A. T. C. 215. FAIRCHILD KR-21. Two-place, tapered wings, for training and sport. Equipped with 90 h.p. Kinner engine. Top speed 113 m.p.h., climb 775 feet per minute, service ceiling, 15,000 feet. An unusual maneuverable ship. Price $4,685 flyaway Hagerstown, Md.

FAIRCHILD

FA

AIRPLANES

FORD 5-AT CLUB PLANE

The newest Ford Club Plane providing luxury for eight passengers

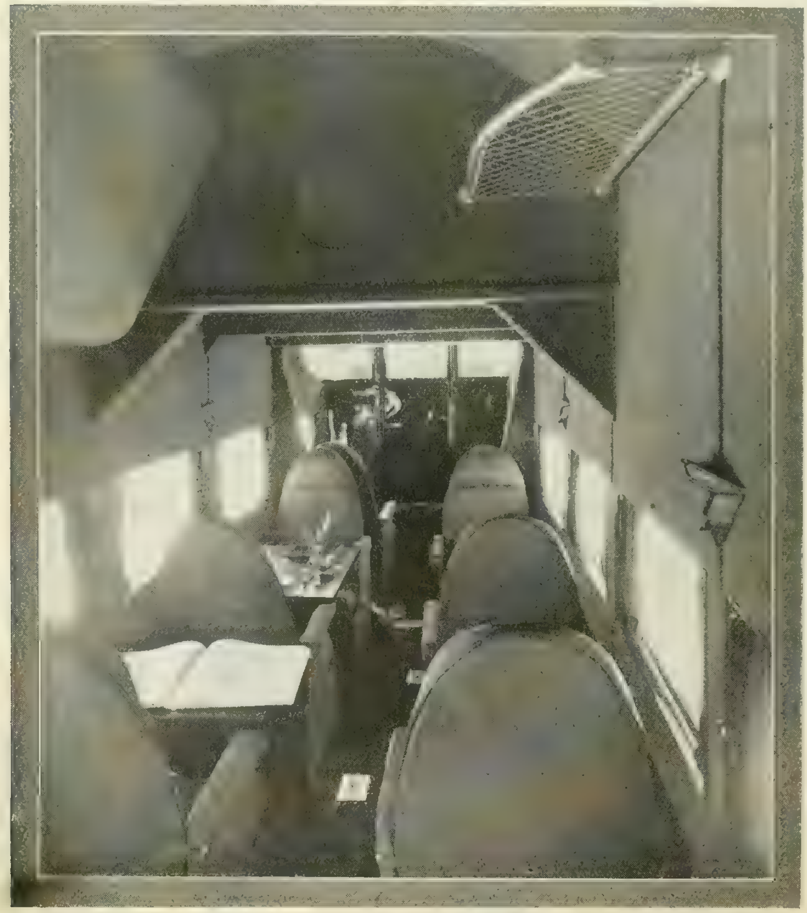
WITH the conversion of a 5-AT trimotor plane by equipping it with berth, lounge chairs, kitchenette, writing desk, loud speaker radio and other conveniences of the club or yacht, the Ford Motor Company has introduced a new club ship especially equipped for the owner who wishes to entertain his guests in the air. But, instead of the usual thirteen seats for passengers, the passenger cabin has been arranged to seat eight persons comfortably and to provide the unusual club features.

This plane was displayed for the first time in a Ford Transportation Exhibit in Chicago. In its design and furnishings little has been spared to afford every possible convenience and comfort. Many of its features are entirely new.

Cabin walls and ceiling are padded with two inches of sound-proofing material to reduce noise to a minimum. The cabin is trimmed in cloth, the head lining being finished in a light tan cord material, the side walls above the windows in a walnut brown and below the windows in a handsome fawn. The floor is covered with a maroon and taupe modernistic rug.

There are in the cabin six reclining overstuffed chairs and a well-appointed two-place davenport, the cushions of which are built up with coil springs to add to the comport. The chairs and davenport are upholstered in a brown striped material and two pillows to harmonize are placed on the davenport. Four of the chairs are grouped so that a card table may be attached to the arms by means of sockets. These sockets may also be used to hold individual serving trays.

In the ceiling, just above the davenport, is a folding standard size berth furnished with a special light weight mattress, sheets, blankets, pillows and pillow cases, all of which are folded into the berth when it is not in use. The berth is arranged to fold out of the way, as in a Pullman car.



Looking forward in the cabin of the Ford 5-AT Trimotored Club Plane

Forward in the cabin is a combination writing desk, radio cabinet and book case finished in attractive black walnut. The radio set, which affords clear reception from stations within a radius of 150 miles, is concealed in a compartment in the rear of the plane with the dials built into the desk. The loud speaker is recessed in the ceiling at midship.

Windows are of the single-plate style and do not open. This construction helps to minimize noise and makes possible a better control of ventilation. A special ventilator is built into the side of the cabin in front of each window. By turning a knob, the passenger can regulate the intake of air. There is a large outlet ventilator in the ceiling of the forward part of the cabin.

Heat is supplied to the cabin by small registers in the aisle. Lighting is furnished by specially designed dome lights and diamond shaped side lights on the walls directly above the passenger chairs.

One of the most interesting features of the plane is the kitchenette situated just opposite the entrance door and partitioned off from the rest of the cabin. Though compact, it is fully equipped to prepare and serve a club luncheon. A combination aluminum sink, drain-board and hot plate with shelf and closet space above and below provide the working place for the chef. Water is supplied from an overhead tank, with a gauge to indicate the amount available. The hot plate is heated by Pyrofax, a concentrated gas carried in a tank concealed in a small cabinet. Small round windows furnish light to the compartment. There also are a small dome light, ventilator and electric fan.

Specially constructed felt-lined racks are provided for cups, saucers, plates and glasses. Another rack holds two vacuum containers so that, if desired, preliminary steps in the preparation of a meal can be taken before a flight.

Just aft of the kitchenette in the rear of the plane is a lavatory. This compartment contains a toilet, wash bowl supplied with running water from a special tank, towel rack, container for soiled towels, soap dispenser and mirror. On one side, partitioned off by a curtain, is a small space which can be used as a clothes closet, golf bag container or gun rack.

(Continued on next page)

FORGET THE WEATHER *when it comes to propellers . . .*

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This Wasp engined Fairchild used for short exploration by the Byrd Antarctic Expedition is equipped with a Hamilton Standard Propeller

● ● WITH the development of the metal propeller came a great extension of the possibilities of all weather flying. Rain, snow, heat or cold are all fair working conditions to the modern metal propeller. You can depend on a Hamilton Standard to deliver complete satisfaction in any sort of weather in which flying is possible.

Further, Hamilton Standard propellers can be stored without deterioration. Wind tunnel tests have shown them to have decided advantages in performance over wood propellers of the same rating, and this definite superiority pays dividends in fuel economy.

Hamilton Standard propellers are available in a variety of stock sizes and types—and arrangements may be made for making up special designs. Correspondence is invited on propeller problems of any sort.

HAMILTON STANDARD PROPELLER CORPORATION

PITTSBURGH, PENNSYLVANIA

●

DIVISION OF UNITED AIRCRAFT
AND TRANSPORT CORPORATION

(Continued from preceding page)

The exterior of the plane has been finished in what is termed "bird's eye". The metal of the wings and fuselage gives the appearance of having been burnished with thousands of small over-lapping circular patterns such as are frequently found on the inside of watch cases. These designs in the corrugated metal reflect the light and give the plane a most unusual and beautiful appearance.

Another feature of the exterior is that all exposed steel parts are chrome plated which again adds to the beauty of the craft.

Complete equipment is furnished for night flying, including navigating lights, instrument lights, landing lights and parachute flares. The particular landing lights used are a new Ford development. They throw a bright spot ahead, enabling the pilot to pick out prominent objects in the distance, and at the same time they cast a soft light in the immediate foreground, to left and right.

The tachometer, oil pressure gauge and oil temperature gauge for the outboard engines are located with the other instruments on the panel in the pilot's compartment instead of on the engine nacelles. The tachometer is electrically operated, a new development.

Another feature is a valve-controlled pressure fire extinguisher which could quickly extinguish a fire in any one of the three engines. Should fire develop in one of the motors, all the pilot would have to do would be to turn a valve controlling the fire extinguisher leading to that engine.

The club plane, like the regular 5-AT model, has a high speed of 138 miles an hour, a cruising speed of 113 miles and a stalling speed of 64 miles. Its normal radius of action is 510 miles and its service ceiling 16,000 feet. It is powered by three Pratt and Whitney Wasp engines developing a total of 1,275 horsepower. The engines have electric starters.

FORD 5-AT SEAPLANE

A SERIES of flight tests have been completed at the Philadelphia Navy Yard with the Ford 5AT trimotor seaplane, the largest seaplane in the United States. The ship was produced by the Stout Metal Airplane Company, Division of the Ford Motor Company, and is a development of the Ford 5AT landplane but is equipped with floats about twenty-two feet long instead of the regulation landing gear with wheels. The floats may be removed and replaced with wheels and the ship readily converted from water to land use.

The ship has been designed for commercial or military use. As a transport passenger plane, the Ford 5AT seaplane will accommodate fourteen passengers in addition to baggage and mail. For military purposes, the plane has been designed for use as a bomber, torpedo ship, a troop transport with a capacity of twenty passengers, or an air ambulance. As a torpedo carrier, the plane has a capacity for two Mark IV torpedoes weighing 1,800 pounds each. As a bomber equipped with landing wheels instead of floats, the 5AT has a useful load of 6,000 pounds, and will accommodate a pilot, radio operator, bomber, gunner, three machine guns, two 1,000 pound bombs, 800 pounds of demolition bombs, and fuel sufficient for about six hours in the air.

The Ford 5AT is powered with three Pratt and Whitney Wasp engines, any two of which will fly the ship at normal cruising speed with the third engine idling. Tests at the Philadelphia Navy Yard showed that with full load the plane has a high speed of 127 miles per hour, a cruising speed of 103 miles per hour, a stalling speed of 65 miles per hour and a take-off time of 17 seconds.

RECENT PATENTS

THE following patents of interest to readers of AERO DIGEST were recently issued from the United States Patent office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of twenty cents each. State number of patent and name of inventor when ordering.

Cam-shaft driving mechanism for internal combustion engines. William O. Warner, Kenmore, N. Y.; assignor to Curtiss Aeroplane and Motor Company. (No. 1,743,173)

Navigational computing instrument. Elliott P. Ross, Freeport, N. Y.; assignor to Ford Instrument Co., Long Island City, N. Y. (No. 1,743,239)

Compensating for error-producing influences in electrical apparatus. Harry L. Tanner, Brooklyn, N. Y.; assignor to Ford Instrument Co., Long Island City, N. Y. (No. 1,743,252)

Aeroplane. Jacob Refsland, New Rochelle, N. Y. (No. 1,743,284)

Aeroplane. Valentine Newbauer, Los Angeles, Cal.; assignor to Newbauer Vertical Airplane Co. (No. 1,743,378)

A standard Ford 5-AT equipped with twin floats twenty-two feet long

Aircraft. Arthur A. Reid, Dickson City, Pa. (No. 1,743,393)

Aircraft. Paul Maiwurm, San Diego, Cal. (No. 1,743,467)

Aeroplane. John Andrews, Elizabeth, Pa. (No. 1,743,516)

Gyroscope supporting and centering apparatus (direction-finder). Arthur P. Davis, Brooklyn, N. Y. (No. 1,743,533)

Airplane carburetor. Frank C. Mock, Chicago, Ill.; assignor to Stromberg Motor Devices Co., same place. (No. 1,743,791)

Flying-machine having two or more supporting-planes. Josef A. Hallender, Stockholm, Sweden. (No. 1,743,887)

Dirigible airship mooring-mast. Ralph P. Fox, Harrisburg, Pa. (No. 1,743,962)

Airplane. Robert J. Haskell, Washingotn, D. C. (No. 1,743,967)

Sextant. Lawrence Radford, Washington, D. C., and Noel Davis, Lee Heights, Va.; assignors to American Sextant Corporation. (No. 1,743,979)

Supporting plane for aircraft comprising movable elements controlled by motors. Andrea Prosdocimi, Este, Italy. (No. 1,744,080)

Airship. Gustavus A. Bess, Seattle, Wash. (No. 1,744,257)

Control-stick for aeroplanes. Thomas C. Croce, East Boston, Mass. (No. 1,744,297)

Kite. Hugh De Haven, New Canaan, Conn. (No. 1,744,529)

Airplane shock-absorber. Harry C. Karcher, Dearborn, Mich., assignor to Ford Motor Co., Highland Park, Mich. (No. 1,744,551)

Propelling device (for aircraft). Lawrence Olsen, Philadelphia, Pa. (No. 1,744,568)

Tail-skid for aircraft. James A. Pendergrass, Franklin Furnace, Ohio. (No. 1,744,572)

Apparatus for loading aircraft. Charles H. Jacobs, San Francisco, and Asa F. Harshbarger, Oakland, Cal. (No. 1,744,638)

Aeroplane-wing. Walter J. O'Connor, Pittsburgh, Pa. (No. 1,744,663)

Mail-bag for aircraft. William E. Berry and Michael Vukovich, Columbus, Ohio. (No. 1,744,719)

Means for insuring the safe landing of airplanes. Edward Hammonds, Ravenna, Ky. (No. 1,744,889(

Aeroplane-propeller. Joseph S. Killeen, New York, N. Y. (No. 1,744,905)

Airplane-loading device. Blaine M. Tuxhorn, Kansas City, Mo.; assignor to Aero-Safe Motors Corporation, Kansas City, Mo. (No. 1,744,934)

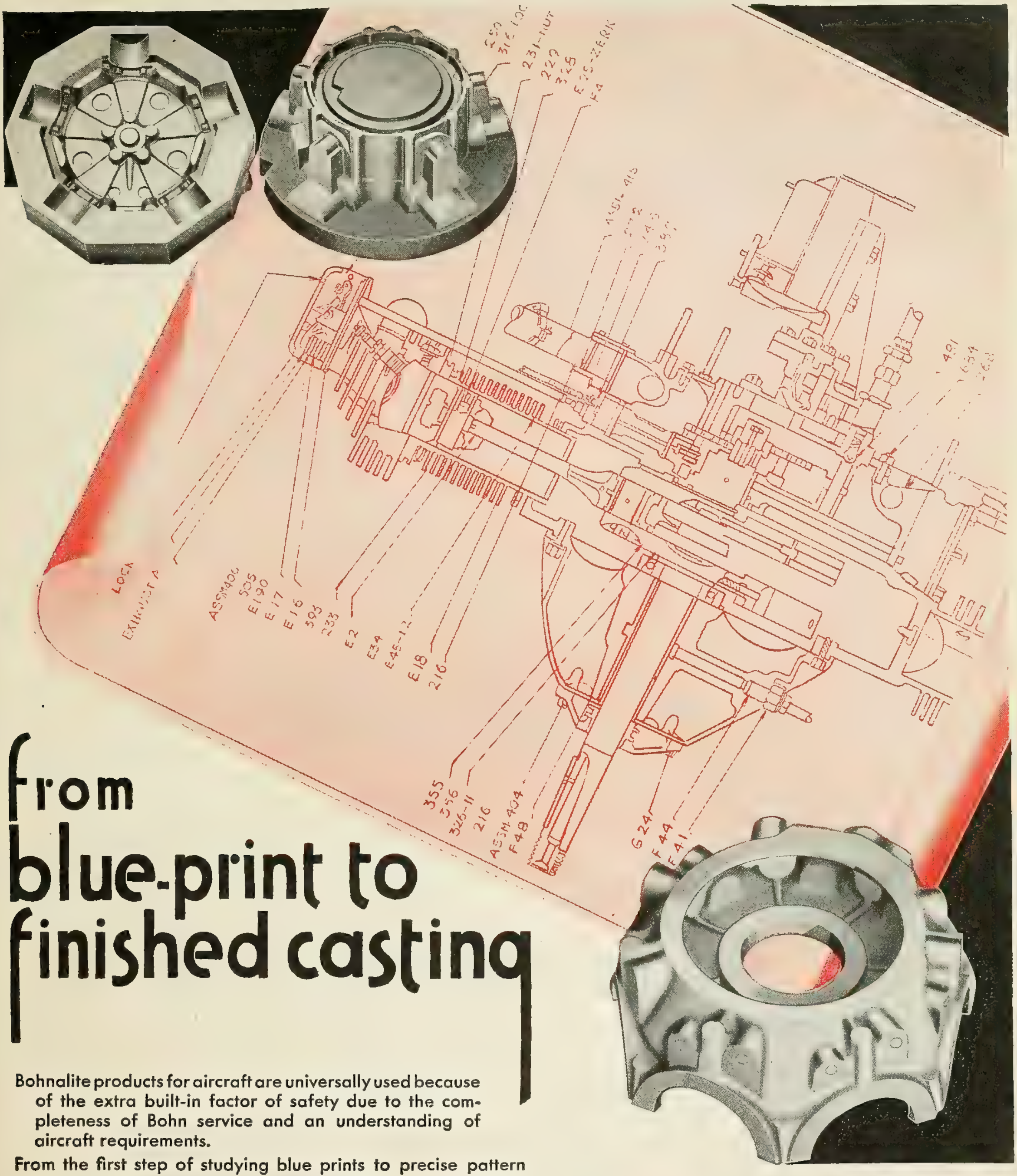
Aeroplane. Harry B. Crumbaugh, Greenville, Tex. (No. 1,745,081)

Power-plant for airplanes. Edmund B. Carns, New York, N. Y.; assignor to Carns Development Co., Wilmington, Del. (No. 1,745,349)

Rudder-bar adjustable foot-rest for aircraft. Ernest G. McCauley, Dayton, Ohio. (No. 1,745,501)

Airplane. Socrates H. Capelis, El Cerito, Cal.; assignor to Capelis Safety Aeroplane Corporation, El Cerito, Calif. (No. 1,745,600

Aeroplane-wing. Mack K. Hopper, Mirando City, Tex. (No. 1,745,677)



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From the first step of studying blue prints to precise pattern making in which dimensional accuracy is a rigid practice, each operation is performed by members of the Bohn organization who have special aircraft training.

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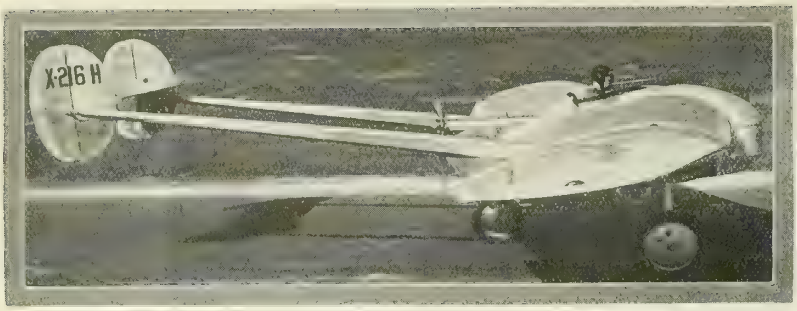


NORTHROP FLYING WING

EXPERIMENTAL flights of the Northrop Flying Wing, an all-metal, all-wing monoplane, were conducted recently by the Northrop Aircraft Corporation at the United Airport, Burbank, Calif., and Dry Lake in the Mojave Desert. The plane has been designed with the purpose of eliminating parasitic resistance to a maximum degree. There is no fuselage, passengers, pilot and the engine being carried inside the wing; bracing, wing struts and all structural and control members (with the exception of the outriggers and tail surfaces) are contained in the wing, and a retractable landing gear is provided.

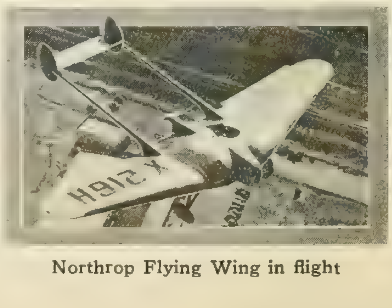
The experimental plane which has been constructed and test-flown has a wing span of thirty feet and, powered with a Menasco Pirate engine, has a high speed in excess of 100 miles per hour. The Northrop Company is a division of the United Aircraft and Transport Corporation, which sponsored the experimental flights of the Flying Wing, and which will sponser further experiments with the object of developing a large transport plane of this type with a cruising speed of 160 miles per hour, and a mail-express plane with a high speed in excess of 200 miles per hour. The Northrop company will continue test flights and wind tunnel experiments with the Flying Wing before any planes of this type will be produced on a commercial scale.

Experiments which have been conducted with the Flying Wing have resulted in an increase of twenty-five to fifty per cent in airplane speed for horsepower, according to the Northrop company. The central wing section, or body, tapers gradually in both plan form and section to a conventional wing on either side. Tail surfaces with a high aspect ratio are supported by widely spaced full cantilever outriggers which extend toward the rear to a point considerably above the main wing. This arrangement, which has been made to remove the control surfaces from any possible turbulence caused by the wing, makes it possible to utilize a closed couple retractable landing gear which is placed immediately beneath the center of the wing and supports the cargo, engines and main structural weight of the plane. The landing gear consists of three wheels placed under the wing in triangular arrangement. The two front wheels are placed as far forward as possible to reduce the possibilities of a nose-over, and the rear wheel is made steerable to provide maneuverability on the ground. No landing loads are carried on the tail support structure.

The engine is carried within the wing structure to eliminate the parasitic resistance of the power plant area. A pusher type propeller is used, affixed on a shaft running back from the engine and practically flush with the trailing edge of the wing. By the use of this drive shaft, the engine can be placed in such a way in the wing that the center of lift and the center of gravity would have the most efficient relationship to each other without the necessity of balancing the weight of the engine with cargo placed in a nacelle for that purpose.

The model plane used in the experimental flights is known as the "baby wing," and is the first flying wing of its size that has been flight tested, according to the Northrop company, although the basic idea of the small flying wing has been experimented with by engineers in various countries. Some European engineers have evolved basic fundamentals of a giant flying wing, but these are impractical for application to planes of the sizes in general use at the present time.

Larger transport planes of the type of flying wing used in the experimental flights have been projected by engineers of the company as the result of the success of the initial flights, and include a twelve-passenger ship with a speed of approximately 200 miles per hour. There would be three rows of four seats in each wing, passengers getting vision by looking ahead and sideways. The pilot and assistant would sit in a streamlined cupola in the leading edge of the wing and have vision in all directions. The model which has been test-flown is powered with a single engine. However, it is planned to construct the Flying Wing transport planes powered with more than one engine. Such planes would have fire-proof, noise-proof engine rooms where mechanics can work while the plane is in flight and will contain sleeping accommodations and other facilities for passengers.



Northrop Flying Wing in flight

The Flying Wing is designed so that twin engines, either pushers or tractors, can be mounted either in the wing or in small streamlined nacelle appendages to the wing. This will permit the inspection and minor repairs of the engines while in flight.

The Flying Wing type of plane has not yet been perfected by the Northrop company, but the model which has been flown experimentally has obtained a performance record which proves, according to the engineers working on the plane, that many problems confronting designers of flying wings have been solved. They believe that, after certain additional tests involving a modification of the power plant and the propellor have been made, the Flying Wing will be manufactured commercially. The Northrop Flying Wing utilizes a central wing section of much greater thickness than has ever before been considered possible, according to the company.

Although the Flying Wing has been designed to increase flying speed by the reduction of parasitic resistance, an increased economy of operation is claimed for this type of plane by its sponsers because a greater speed and distance for a given amount of horsepower is made possible.

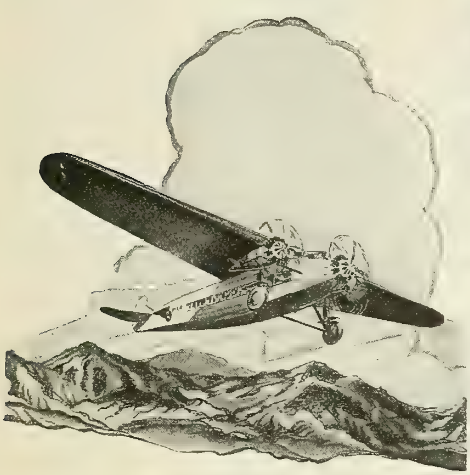
The Northrop Flying Wing was designed by John K. Northrop, formerly chief engineer of the Lockheed Aircraft Company.

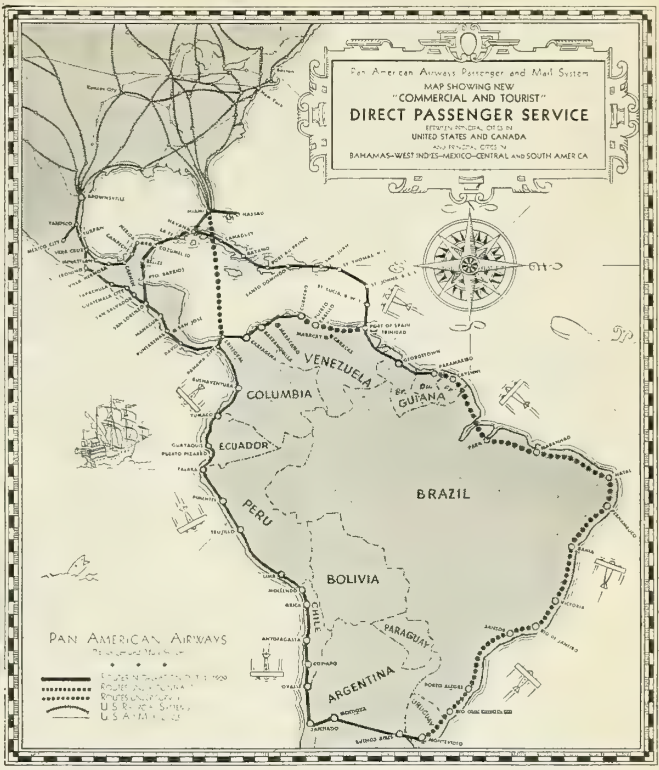
DU-GAS AVIATION FIRE EXTINGUISHER

A FIRE extinguisher designed to meet the requirements of the aviation industry has been developed by the Du-Gas Fire Extinguisher Corporation of New York City. This extinguisher is efficient on extra-hazardous fires, resulting from grease, oil, paint, gasoline, dopes, Japanning compounds and alcohol, according to the Du-Gas company, and it quickly disperses smoke, blots out flames and dispels heat on fires too large to be put out by apparatus. The extinguisher emits no fumes, is non-injurious, non-freezing and is readily available, according to the company, being especially designed for airplane hangars.

MONEL METAL GROMMETS

GROMMETS of Monel Metal have been adopted by the Goodyear-Zeppelin Corporation of Akron, Ohio, for use in the construction of the dirigible ZRS-4 which the company is building for the United States Navy. The grommets will be used to attach the gas bag and fabric covering to the frame of the ship. Monel Metal is a nickel-copper alloy designed to resist corrosion and give a maximum structural strength. The grommets used are similar to the ordinary eyelet, and are placed in the fabric of the gas bag to prevent tearing when the material is attached to the frame.





WHEN FIGURES FAIL

In two years, Pan American Airways has grown to a point where figures no longer adequately convey its story.

How far is 88,000 miles? Pan American Airliners fly that distance each week in scheduled flights.

Try to visualize four and one half million miles. Pan American Airliners will fly more than that distance during 1930 on existing lines.

Picture 2,000 flying hours. Each Pan American pilot and co-pilot had flown that distance before joining the System.

Or make an effort to translate these figures into pictorial terms:

Every pilot and co-pilot flew a distance equal to eight and one half times around the world before acquiring the necessary experience to qualify him for service with the System. Scheduled flights each week equal more than three round-the-world flights at the equator. During 1930 total scheduled mileage will equal more than 183 round-the-world flights.

Behind These Flights

The system and organization that enabled Pan American Airliners to fly more than two million miles during 1929 with mail and passengers have been extended and perfected. Flights of last year were accomplished with 99.7 per cent. adherence to schedule. It is the ambition of each Pan American employe to better this record for more than double the mileage during the current year.

To this end, literally scores of airports and intermediate landing fields have been developed throughout the 21 countries of North, Central, and South America where Pan American service now extends.

Hundreds of employes have been trained for the exacting duties that make high-efficiency transportation a possibility.

More than $2,000,000 has been invested in latest types of large multi-motored airliners.

Cooperation That Spells Progress

This rapid development from a single line 261 miles long to 12,000 miles of airways throughout Latin America, has been made possible only by the loyal cooperation of many diverse interests.

The United States Government and other governments have made possible the extension of airways by awarding of airmail contracts. This aid continues and has been extended.

American railways have joined forces financially and also with strong traffic agreements for the reciprocal sale of through tickets and reservations to and from points in Latin America.

American aviation interests have played, and are playing a part in the development of Pan American Airways. Large and diversified aviation groups have furnished important financial backing. Domestic air transport lines are making direct through connections for air mail and passenger service.

All these factors have pooled their interests to provide rapid international transportation from New York to Buenos Aires,—in short, from all chief cities of the United States to chief cities throughout Central and South America.

PAA

PAN AMERICAN AIRWAYS, Inc.

122 EAST 42nd STREET, NEW YORK CITY

LYCOMING AIRCRAFT ENGINE

ANNOUNCEMENT was made recently by the Lycoming Manufacturing Company, Williamsport, Pa., of a new nine-cylinder radial aircraft engine. Horsepower rating by the Department of Commerce is 210, although the company claims the engine develops greater power. Tests have been made over a period of nearly two years and the engine has been installed in various types of planes and has been flown in numerous climatic conditions. Full Government tests have been completed and Approved Type Certificate No. 42 has been assigned to this engine by the Department of Commerce. In the design of the engine reliability has been emphasized. Although the weight is as light as average (2.24 pounds per horsepower at 210), Lycoming officials state that the structural strength has not been sacrificed.

Oil pipes have been dispensed with, both the pressure and return oiling systems operating through cored and drilled holes in the castings. In order to secure proper fuel mixture distribution, a rotary induction system is used. In order to eliminate gear trains and high speed rotary parts, an engine speed impeller of rather large diameter has been employed.

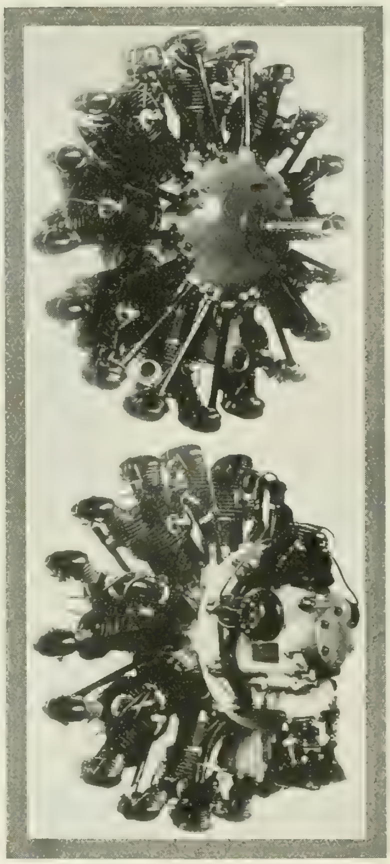
To attain smoothness and quietness of operation, a quieting curve on the cam ring is fitted, as well as the rotary induction system. It is said that, through this system, the free flow area throughout the induction system has been kept constant, thus resulting in good acceleration qualities at all speeds.

Careful attention has been given to the design and cooling of the exhaust valve. The fin area is ample to carry off heat, and a hollow stemmed valve, filled with metallic sodium, was adopted.

The design of the cylinder is of the conventional type for air-cooled engines. The cast aluminum alloy cylinder head, with rocker arm supports cast integral, is screwed and shrunk on a machined carbon steel barrel. A copper gasket is used between the head and barrel to prevent leakage. Bore is 4⅝ inches and stroke 4½ inches, with a piston displacement of 680.4 cubic inches.

The hollow stemmed exhaust valves are cooled with metallic sodium and have tulip shaped heads of chrome tungsten steel. Intake valves, also of tungsten steel, have a solid stem with practically flat heads. The valves are spread thirty degrees from the center line of the cylinder and face the air stream to procure adequate cooling of the valve seats. Valve seats are of aluminum bronze, shrunk into the cast aluminum alloy head.

Cams, cam drive gears, cam followers, etc., are located in the forward part of the crankcase. Cams have four lobes each and run at one-eighth engine speed. Push rods, rocker bearings and rockers are totally enclosed, but the valve springs are exposed in order to prevent oil from collecting on the valve stems, to aid valve cooling and to reduce the corrosive effect of the exhaust gases on ball bearings, etc. The rockers run on ball bearings and are lubricated by the Alemite Zerk system.



Lycoming 210 h.p. aircraft engine

Two springs are used on the intake valve and three on the exhaust valve. All springs are made of round wire helically wound in the same direction.

The crankshaft is of the two-piece, clamp type design. The clamp proportions have been selected so that the tightening of the bolt will neutralize such stresses as are produced by the forcing of the clamped end over the crank pin. The hollow shaft is counter-weighted in conventional proportions and the counter-weights are forged integral with the shaft. The shaft rides in three bearings, the ball thrust bearing and the two main ball bearings.

The connecting rods consist of one master rod and eight link rods. The master rod is of one-piece construction, machined from a chrome nickel steel forging and provided with a steel back babbitt lined bearing. The link rods are of forged aluminum alloy and are pinned to the master rod with nitralloy link pins. Bushings in the link rod ends have been eliminated and the aluminum bears directly on the nitrided link pins.

Aluminum alloy permanent mold cast pistons are used. The piston design incorporates an extensive system of ribbing on the under side of the head to provide adequate cooling, and care has been given to the rigidity of the piston pin bosses as well as to the piston as a whole. Three rings are used above the piston pin and one below.

The full floating piston pins are of generous size and made of nitralloy. The pins are held in the piston by means of snap rings to prevent scoring of the cylinder walls by the pin ends.

The crankcase assembly is built up of four components held together by studs and nuts: the thrust bearing housing, which contains the thrust bearings and cam followers guides; the main bearing plate, which carries the front main bearing and cam drive assembly; the crankcase proper, which carries the rear main bearing and is provided with the cylinder pads; the rear accessories housing, which contains the drives for the magneto, distributors, oil pump, tachometer and generator. This last component also provides a mounting for the engine starter and carries the alignment bearing for the accessories drive shaft. These crankcases are made from heat-treated cast aluminum alloy, with the exception of the main bearing plate which is an aluminum alloy forging.

The oil sump is of cast aluminum alloy studded to the crankcase and thrust bearing plate. This sump also acts as a housing for the oil strainer.

The accessories drive shaft is an alloy steel shaft, splined to the rear accessories housing. This shaft carries the accessories drive gears and starter jaw.

Ignition is furnished by one dual type vertical magneto with two independent distributors. Two entirely separate electrical currents are thus available, each firing one plug per cylinder. The whole ignition system can be shielded for radio interference, should it be desirable.

The Stromberg NA-R7 carburetor is used. This unit is a single-barrel type equipped with a mechanical economizer and an accelerating pump.

As mentioned previously, a rotary induction system is employed. This system consists of a cast aluminum impeller of rather large diameter driven at engine speed. The free flow areas throughout the induction system have been kept constant, resulting in a uniform distribution of gas at all speeds. The mixture is carried from the impeller chamber to the cylinders through intake pipes radiating tangentially from the case. This design results in a complete breaking up of the mixture and an even distribution to each cylinder.

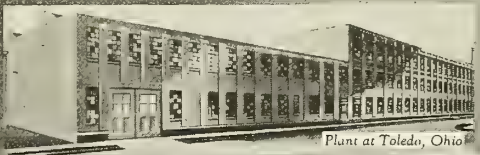
The lubrication system consists of one pressure pump and two scavenging pumps built into one complete unit. The pressure pump supplies oil to the entire engine through drilled passages. There are three main pressure feeds; one to the forward end of the crankshaft where the oil enters the crankshaft through a grooved sleeve; two jets extend into the oil passage in the

(Continued on next page)

MOTO METER

GAUGE & EQUIPMENT CORPORATION

Plant at La Crosse, Wis


Plant at Toledo, Ohio

THE MARK OF MOTO METER HIGHEST QUALITY

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THE name MOTO METER is a guarantee of the excellence of any instrument or gauge on which it is placed. The three great plants of this company, now one of the world's largest manufacturers of gauges and allied equipment, are devoted to the manufacture of products of the highest quality.

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LONG ISLAND CITY, N. Y.
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Factories at Long Island City, Toledo, La Crosse, Canada, England, France, Germany, Australia

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MOTO METER Aviation Instruments have established fine records in the service of the leading airplane manufacturers and have been standard equipment on many of the recent history making flights and tests.

Oil Pressure Gauges, Fuel Gauges, Heat Indicators and the recently perfected Ice Warning Indicators are all instruments of highest quality and unfailing accuracy.

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(*Continued from preceding page*)

crankshaft and these lubricate the cam spider bearing and the cam drive gear. These jets extend well into the passage to prevent dirt or sediment from plugging them up. The oil then enters the crank pin and is distributed to the master rod bearing through a jet and grooves machined in the back face of the bearing. The link pins also receive lubrication from this source through grooves machined in the master rod.

The second pressure feed enters the cam idler gear pin through drilled passages and is sprayed out through a small hole in the gear. This lubricates the cam idler gears, and the oil is sprayed out onto the cam gear and cam followers.

All oil from these two feeds drains into the oil sump at the bottom of the crankcase and is scavenged through a strainer screen by means of one of the scavenging pumps.

The third pressure feed enters the distributor shaft through a drilled passage and is sprayed to all gear and bearings in the accessories housing. This oil is scavenged through a strainer by the second scavenging pump.

The cylinder walls and piston pins are lubricated by splash.

In laying out the lubrication system, attention has been given to the complete elimination of all piping. Complete tank circulating system is used. An oil pressure of 60-75 pounds is recommended for this engine. Oil pressure is controlled by an external adjustable oil pressure regulator.

A tachometer drive pointing directly toward the rear and conforming to standard dimensions is incorporated in the design. This unit is easily accessible when the engine is installed in the plane and the design is such that it can be withdrawn together with its gear for inspection.

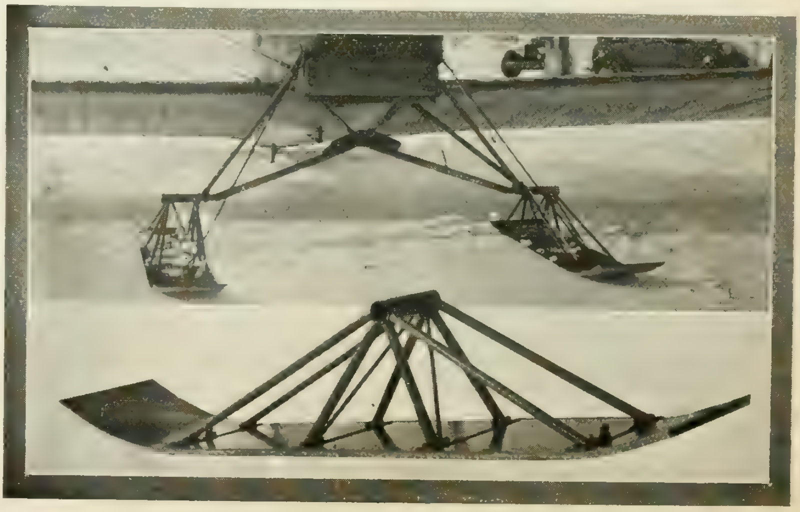
A generator drive and mounting is incorporated in the engine design. The mounting and drive gear can be withdrawn as a unit for inspection.

HASKELITE PLYMETL SKIS

AT THE St. Louis aircraft show, Plymetl skis were shown for the first time by the Haskelite Manufacturing Corporation. They are constructed entirely of Plymetl, the metal-faced companion of Haskelite, albumin glued aircraft plywood. They are reported to be rugged and strong for their weight, and are water-proof, since the steel is turned over the edges and soldered.

At present, these skis are being tried out by the Furniture Capitol Air Service, Grand Rapids, Michigan, and although they are in an experimental stage, they are said to be giving satisfactory service.

The skis shown at St. Louis were 75 inches long, 19½ inches, and ¾-inch thick. The steel faces are bent over the edge and soldered, and the panel is bent up at both ends. The Haskelite Manufacturing Corporation supplies these skis made up to individual requirement. Brackets are not included, only the ski itself is manufactured.



Haskelite Plymetl skis as used on an Eaglerock biplane

SWINGING BASES FOR COMPASSES

By Captain Leslie S. Potter

ALTHOUGH under present rules airplanes are permitted to fly distances up to 100 miles without compasses, and many of the younger pilots today regard the compass as an instrument of last resort, this idea is probably fostered largely by the absence of swinging bases at many flying fields, and the prevalence of the notion that a swinging base is a necessity in swinging a compass.

Although a swinging base is a convenient adjunct to swinging small and medium sized aircraft, the movement of which involves only a small amount of man-power, it is surprising that a swinging base is so generally considered a necessity. Large multimotored planes are generally much more conveniently swung without a base, because of their size and the difficulty in aligning them accurately and easily. A ship can normally be swung as accurately and more speedily with the use of an accurate landing compass in the hands of an experienced compass adjuster, than on a swinging base.

The accuracy of a landing compass may be determined by taking bearings with it on distant objects, and these should agree with similar magnetic bearings taken from a map of the district, providing there are no local magnetic disturbances. The latter may usually be avoided provided the site on which the bearings are taken is at least fifty yards away from any masses of iron such as iron structures, railways, etc. Alternatively, two landing compasses may be placed approximately 200 yards apart and reciprocal bearings taken. If these agree, or by the first method, if the bearings agree with those taken from a local map, the landing compass may be assumed to be accurate, and the site selected to be free from local magnetic disturbances.

The plane can be headed on an approximate magnetic course by its own motors and with reference to its own compass, unless the deviations are large, when it should be headed exactly on the cardinal and quadrantel points. Generally speaking, provided the maximum deviation does not exceed ten degrees, errors up to four degrees in aligning the ship on the various points will not sensibly affect the accuracy of the swing, provided of course these are allowed for. For example, if instead of aligning the ship accurately on 270 degrees it were aligned on 273 degrees, and if the reading on the landing compass were 274 degrees, the ship's compass would have a minus or westerly deviation of one degree, which it may be assumed would have been the same had it been accurately aligned on 270 degrees. The marks or lines on the ship on which the bearings are taken will obviously vary according to the type of ship being swung.

When the swinging of light or medium ships only is involved, it may be desirable to layout a swinging base. A suitable site should be chosen, conveniently placed relative to the hangars, but one not likely to be in the way of airplanes taking off or landing. It should also be free from local magnetic disturbances. The base should be set up by drawing a circle with the landing compass as its center. The diameter of the circle is determined by the length of the planes likely to be swung on it, but forty to fifty feet is usually a suitable diameter. An assistant holds a straight rod vertically on the circumference of the circle and is instructed to move it until it is on some cardinal or quadrantel bearing from the compass. A peg is then driven into the ground at the foot of the rod. The process is repeated until all cardinal and quadrantel points are pegged out. These will generally be sufficient. Radiating lines are then laid from the center to all these pegs. In laying these lines, cords may be used or lines painted, depending on the degree of permanence of the compass base and the nature of the ground.

Travelling in MINUTES *where* HOURS *were once required*

How a Sikorksy Amphibion helps Bror G. Dahlberg to be in Chicago, New York and Florida in one week

•

Photo Fairchild Aerial Surveys

How the Florida country looks from the comfortable cabin of a Sikorsky Amphibion.

THE operation of the Dahlberg Sugar Cane Industries frequently requires Mr. Bror G. Dahlberg, their founder and executive head, to be in the North, East and South all in the same week. He travels almost entirely by air, using the comfort, speed and adaptability of his Sikorsky Amphibion to save him many invaluable hours each week.

With a full load cruising speed of 110 miles an hour, the "S-38" Amphibion cuts ordinary travel time in half. Two Pratt & Whitney 420 H. P. "Wasp" engines provide a wealth of reserve power.

Every bay, harbor and lake is a landing field for the "S-38." A touch of a control drops the wheels and converts her to a splendid landplane. Many executives whose wide interests force them to spend many hours a week in travel are saving time . . . and doubling their travel pleasure . . . by using the "S-38." An unusually attractive folder has just been issued, describing this ship. May we send you a copy? Sikorsky Aviation Corporation, Bridgeport, Connecticut. Division of United Aircraft & Transport Corporation.

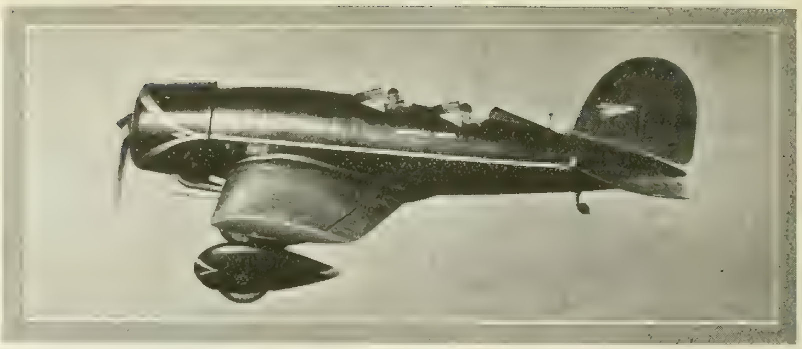
This 10-passenger Sikorsky Amphibion used by Mr. Dahlberg in keeping in touch with his widespread business interests, is powered with two 420 H. P. Pratt & Whitney "Wasp" engines, and can fly and maneuver on either engine

SIKORSKY AMPHIBION

LOCKHEED "SIRIUS"

SUPPLEMENTING the description of the Lockheed Sirius monoplane, which appeared in the January issue of AERO Digest, the following data on the Sirius are given, representing revised specifications. The accompanying line drawings of the plane were obtained recently from the Lockheed Aircraft Corporation of Burbank, Calif., a division of the Detroit Aircraft Corporation, manufacturers of the ship.

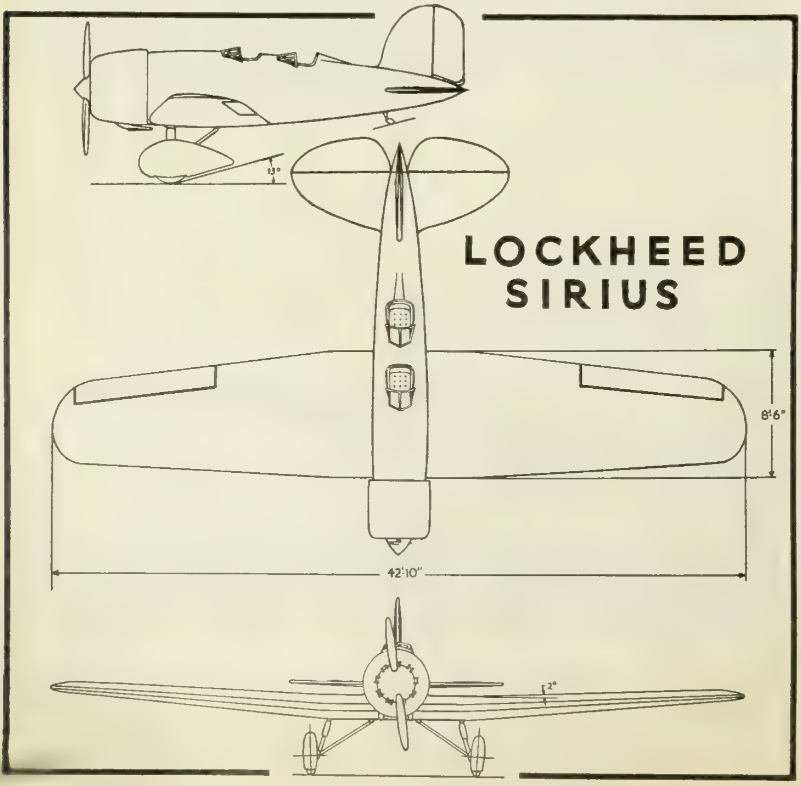
The first Lockheed Sirius plane was constructed by the Lockheed company for Col. Lindbergh. In preparation for the manufacture of the Sirius on a commercial scale, certain revisions in the specifications of the plane were made, preserving the original appearance of the ship which has been designed as a high speed sport monoplane. Particular attention has been given to streamlining, the engine being completely enclosed in an N. A. C. A. cowling which, it is estimated, increases the speed of the plane fifteen miles per hour. This streamline effect is carried on throughout the fuselage from the engine to the control surfaces. Two cockpits are provided and located well in the rear of the wing. Both are equipped with a complete set of controls and flight instruments. The wings are of low-wing cantilever construction. A Pratt and Whitney Wasp engine powers the Sirius and develops 425 horsepower at 2,000 revolutions per minute.



The Lockheed "Sirius" monoplane which has a speed of 180 m.p.h.

Specifications

Span	42 feet 10 inches
Length overall	27 feet 6 inches
Wing area (not incl. ailerons)	280 square feet
Aileron area	25 square feet
Total wing area (incl. ailerons)	305 square feet
Stabilizer area	39 square feet
Elevator area	25.5 square feet
Fin area	11 square feet
Rudder area	11 square feet
Wing loading	17.46 pounds per square foot
Power loading	12.6 pounds per horsepower
Weight empty	2,780 pounds
Useful load	2,450 pounds
Gross weight	5,325 pounds
Fuel capacity	500 gallons
Oil capacity	30 gallons
High speed (sea level)	180 miles per hour
Cruising speed	150 miles per hour
Landing speed	45 miles per hour



Outlines of the low-wing Lockheed "Sirius" monoplane

PASSENGER AIRPLANE PARACHUTE RELEASE

By GENE SMITH

A PARACHUTE device whereby as many as six persons can be lowered to earth by means of a large parachute attached to an automatic trap floor of one compartment of a passenger airplane is now being patented preparatory to production on a commercial scale.

This automatic parachute and trap floor is the invention of Master Sergeant Erwin H. Nichols, who developed the form-fitting pack now coming into use among fliers in both military and commercial aviation. Sergeant Nichols is an instructor in the parachute section of the Primary Flying School, Brooks Field, Texas. Working with him on the new safety device is Jasper A. Gilliam, a civilian employee at the field.

Sergeant Nichols is developing the new device on the principle that passengers in the air should not be depended on to pull their own rip cords in an emergency. Instead, this responsibility is being placed on the trained pilot, who must release the lever that ejects the trap floor. A series of springs would automatically throw the trap floor clear of the frame, and at this the parachute would be released and begin to open as the floor cleared the ship. It would then inflate and permit the passengers to float to earth—seated in their cabin chairs. Arrangements also would be made for air tanks and life savers for keeping afloat on water. Sergeant Nichols maintains further that passengers could save themselves from the danger of careening by fastening their safety belts. Even if they were unbuckled when the descent is started, the passengers would have time to fasten them.

The parachute would be folded and placed in a wire basket, suspended from the ceiling of the compartment by metal struts. These struts would converge, at which point they would be attached to the cords of the parachute. By having this point as close as possible to the floor of the compartment, the rocking of the section as it floats down to earth, would be eliminated. Automatic release of the trap floor would cause the rip cord to be pulled, but the parachute would not begin to open until after the floor has cleared the frame of the plane.

Airport, Hangar and Radio Laboratory of Aircraft Radio Corporation, Boonton, N. J.

Radio Is A Vital Safety Factor In Modern Flying

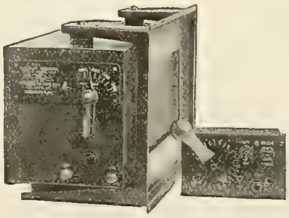
SAFE flying is no longer limited by the performance of uncertain engines or erratic airplanes. Pilots are more skilful, aircraft are more trustworthy, than ever before. But the weather remains uncontrollable, imposing serious restrictions upon air travel.

Radio is the one dependable link between the earth and the ship in the air, unaffected by visibility or winds. Radio beacons provide certain guidance along shortest routes. Radio communication promotes fast traffic—maintenance of schedules. Radio instruments promise safe landings!

Aircraft Radio Corporation was the first commercial organization to provide a common meeting ground for the aviator and the radio engineer. A subsidiary of Radio Frequency Laboratories, with many years' experience in radio research and design, it maintains an independent staff of radio engineers solely for the development of aircraft radio.

Look for the mark "Licensed by RFL and Aircraft Radio Corporation" on radio equipment. It insures a product of sound electrical design, tested and refined under exacting conditions of both private and commercial flying.

Aircraft Radio Corporation is the sales representative and installation agent for equipment of its design



manufactured by Stromberg-Carlson Telephone Manufacturing Co., and the National Carbon Company, Inc.

AIRCRAFT RADIO CORPORATION

SUBSIDIARY OF RADIO FREQUENCY LABORATORIES, INC.

BOONTON NEW JERSEY

Three Curtiss-Wright radial motors powered the Byrd plane in its flight over the South Pole

Curtiss Wright

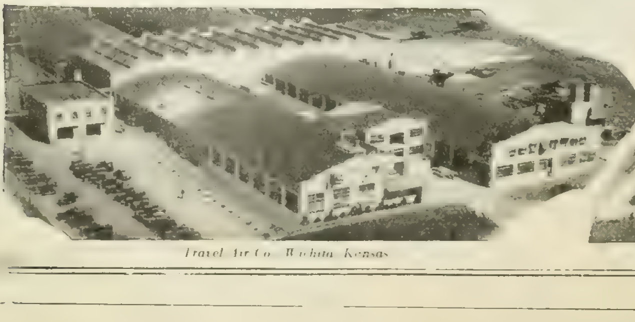
The Curtiss-Wright Robin is an ideal comfortable cabin plane for commercial and private use

The Fledgling training plane used in Curtiss-Wright Schools and adopted by the U. S. Navy for training purposes

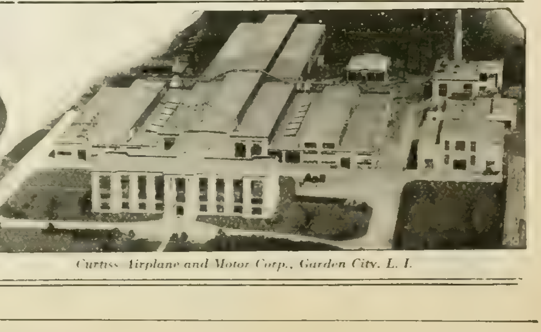
If you intend to enter aviation, there is no better way than through Curtiss-Wright—World's Oldest Flying Organization—whose achievements are bringing to America world-mastery of the air.

ILLUSTRATED on these pages are outstanding reasons why you should entrust your education in aviation to Curtiss-Wright. They represent the greatest, most recent advancements in aviation...are the background which adds so much to your confidence and prestige as a Curtiss-Wright trained pilot.

Curtiss-Wright operates forty Ground and Flying Schools. These constitute a great university of the air, under the direction of veteran, expert pilots and leaders in aviation. The equipment—from the famous "Fledgling" to the smallest instrument in the laboratory—is of the highest quality available. The instructors are specially trained to teach—the courses have



Travel Air Co., Wichita, Kansas



Curtiss Airplane and Motor Corp., Garden City, L. I.

The Tanager—the world's safest airplane, winner of the $100,000 international safety contest in which it proved its supremacy

Leadership...

been prepared in cooperation with the United States Department of Commerce.

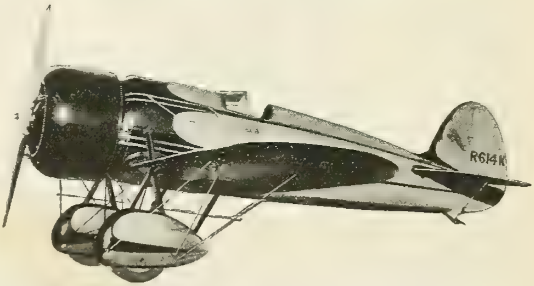
Aviation is now a business—a huge, fast-growing, romantic industry—full of opportunities for the well-trained. In fact, stringent measures have been taken to keep out the unfit and misinformed. Today, to be licensed to fly, you must pass tests on the very subjects which are the basis of Curtiss-Wright School courses.

There is no short-cut. You must pass these tests. And to gain the necessary knowledge and ability there is no better way than that which famous flyers say is best—through Curtiss-Wright.

To make it easier for you to start, Curtiss-Wright offers the new finance plan. You make a small down payment and pay the balance after you learn to fly.

Mail the coupon. Check the courses you are interested in. Ask for a copy of the Curtiss-Wright Flying Booklet. Get into aviation the right way—with Curtiss-Wright. Mail the coupon now.

The Condor, an 18-passenger transport plane, is the last word in comfortable and speedy transportation



The Travel Air Mystery Ship, the fastest commercial airplane in the world

Keystone Aircraft Corp. Bristol, Penna.

CURTISS-WRIC
Gentlemen:
informa

THE AIR SERVICES

REVIEWING the "ARCTIC PATROL"

By T. R. Langley

THE morale and stamina of Air Corps officers and enlisted men was the dominating factor in the profitable completion of the winter tactical mission experiment conducted during January by twenty-two planes of the First Pursuit Group, under the command of Major Ralph Royce. Flying in sub-zero temperatures, through high winds and blizzards and over terrain practically unmapped for air travel, twenty-three officers and twenty-three enlisted men participating in the flight obtained data of military value on the performance of such a mission under the worst possible conditions.

The personnel suffered from the intense cold while in the air and on the ground, and several members required medical attention for frostbite during the mission. Where over-night stops were made the planes were left in the open, being chopped free of ice which had collected and the engines warmed up when the flight was resumed the following morning. While the planes were on the ground minor repairs were made, the men working in temperatures below zero, with snow lashed by high winds drifting about the ships. Personnel making repairs found it necessary to wear lined face masks for protection. At times they were required to remove their gloves while making repairs at the risk of freezing their hands. Maintaining a fine "esprit de corps" under the dangerous weather and topographical conditions imposed by the hazardous tactical mission, they repaired the planes and engines as well as was possible in the operation of a fighting unit of the Air Corps at a great distance from the base of supplies.

Before the half-way mark was reached, the planes were scattered over a 1,000-mile storm-bound area, several having negotiated the hazardous flight across the Continental Divide ahead of the severest storm encountered on the voyage, leaving the remainder of the flight to wait for clear weather. Considerable difficulty was experienced as the result of flying th sleet, the and f oming ing d

which will be of aid, resulted from the winter mission performed by the First Pursuit Group. The "Arctic Patrol" was the first detachment in the history of the Air Corps to perform such a mission under the difficult conditions imposed.

One of the severest tests imposed upon the personnel was that of finding an effective method of warming up engines after the planes which they equipped had remained in the open during the night. Steam lines from the heating units installed in the buildings at the flying fields where stops were made were utilized for this purpose. However, the most satisfactory method discovered after experimentation was the use of firepots ordinarily used by mechanics and plumbers to heat soldering irons. Quick starting of engines has been stressed by the Air Corps as of prime importance in military maneuvers, and data obtained on the flight as to the performance of engines in this respect will be of utmost value in future flights.

The flight demonstrated the skill of the personnel in making repairs to planes in the field, and indicated the extent to which these repairs are possible under battle conditions. Battered skis were repaired well enough to permit the continuation of their use on the planes for taking off and landing; engines were looked over, valves checked and the fabric covering wings and fuselage was mended. Broken parts were replaced with the limited facilities for this purpose which were at the disposal of a detachment in the field; one plane was "washed out" on the flight and every available part was used to repair the other ships which had been damaged. Several planes were equipped with new power plants which were transported by a transport plane detailed to the flight and used to carry parts from distant supply bases.

rps
rt W. Stevens

Twenty-one of the twenty-two planes which left Selfridge Field, Michigan, on January 10th on the flight to Spokane, Wash., returned to Selfridge Field on January 29th. The flight not only contributed valuable data on military tactics but also demonstrated to a wide public the morale and skill of Army Air Corps personnel in the performance of a difficult assignment.

CAPT. A. W. STEVENS TO GET MACKAY TROPHY

RECOMMENDATION has been made of Capt. Albert W. Stevens, Army Air Corps, to receive the Mackay Trophy for 1929 for the most meritorious flight performed by an officer in the Air Corps during the past year. The award is made annually either as the result of a competition open to officers of the Army Air Corps and under rules made each year by the War Department, or to the officer or officers who have made the most meritorious flights during the year. No provision was made for a competition for the trophy in 1929, the board recommending the award to Capt. Stevens on the basis of the most meritorious flight.

Three major flights made by Capt. Stevens during 1929 were considered by the board as a combined achievement of material contribution to the Air Corps and to aviation in general. On February 7, 1929, Capt. Stevens ascended to an altitude of 35,611 feet, making accurate notes of the engineering and meteorological features of the flight, the resulting data proving of value to the Engineering Division of the Air Corps. Accompanied by Lieut. John D. Corkville as pilot in a standard observation plane, Capt. Stevens on March 3, 1929, made night photographs of the Capitol and the White House from the air. On August 12 he took off from Eugene, Ore., on a 14,000-mile photographic tour of the Northwest, during which he made a photograph of Mount Rainier from a distance of 227 miles. Considerable data on long-distance aerial photography, especially of value in taking photographs of points behind the enemy's lines in wartime, was obtained by Capt. Stevens on the tour.

Memorial Chapel to be Erected at Lakehurst

PLANS for the erection of a memorial chapel at the Naval Air Station, Lakehurst, N. J., to be dedicated to those who have lost their lives in aviation, were announced recently by the American Legion, Department of New Jersey. The estimated cost of construction will be approximately $150,000, and the Legion will supervise a campaign to raise the necessary funds among the church organizations. The chapel will

(*Continued on next page*)

The BATTLE FLEET.. CORSAIRS are always with it

WHEN the commanding officer swings a modern battle fleet into action he must have accurate, up-to-the-minute information.

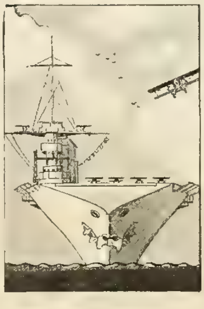
A generation ago naval commanders had scant means of getting this information. Today they get it from the air.

That is why the aircraft carriers, with their squadron of Corsair observation airplanes on board, are so important an adjunct to our battle fleets. And the carrier planes are supplemented by *Corsairs* on each battleship and carrier.

Wear and tear on planes with a battle fleet cannot be compared with ordinary service flying. As a landplane, quick take-offs must be made from the carrier's deck. As seaplanes they are catapulted from the decks of the battleships and cruisers. When the desired information has been secured through air observation, landings must be made into arresting gear, or on the water alongside the mother ship. It requires an airplane of exceptional sturdiness—of rugged dependability and maneuverability—to stand the gaff.

These exacting qualities have been built into the *Corsairs.* They are the qualities that have made the *Corsair* an outstanding contribution to American aircraft design. CHANCE VOUGHT CORPORATION, Long Island City, New York. Division of United Aircraft & Transport Corporation.

CHANCE VOUGHT



CORPORATION

(*Continued from preceding page*)

be known as the Cathedral of the Air and will be of modified Gothic design.

The United States has accepted the chapel and will care for it in perpetuity. The memorial will minister to the needs of officers and men at Lakehurst, and a Navy chaplain will act as dean. The chapel will be non-denominational.

Field Exercises at Mather Field, Sacramento, Calif., to Be Held During April

THE Army Air Corps will hold field exercises during the month of April at Mather Field, Sacramento, Calif., according to a recent announcement of the War Department. The exercises will be held for the purpose of testing new equipment and tactical principles, and to train individual personnel and units in coördinated and individual missions.

The units of the Air Corps, with approximately 135 planes, which will participate in the field exercises at Mather Field are as follows: Second Bombardment Group, Langley Field, Va., thirty-eight officers and forty mechanics; Third Attack Group, Fort Crockett, Galveston, Texas, thirty officers and thirty mechanics; First Pursuit Group, Selfridge Field, Mich., forty-six officers and twenty-six mechanics; Seventh Bombardment Group, Rockwell Field, San Diego, Calif., thirty-two officers and forty-eight mechanics; Ninety-first Observation Squadron, Crissey Field, San Francisco, Calif., sixteen officers and ten mechanics.

Air Corps Reserve Officers Become Second Lieutenants in Regular Army

FIFTY-FOUR officers in the Air Corps Reserve have been appointed second lieutenants in the U. S. Army Air Corps, as a result of examinations held October 7-12, according to a recent announcement of the War Department. At the time of the examination the majority of these officers were on extended active duty at Air Corps fields. The Air Corps Reserve officers appointed to the Air Corps, Regular Army, are as follows: Edward Lapsley Anderson, Edward Wharton Anderson, Jesse Auton, Donald Harvey Baxter, Joseph Wiley Baylor, Alfred Lot Beatie, Leon Ray Brownfield, Robert Whitney Burns, Cyril Chappelett, Robert Oswald Cork, John Coleman Covington, Kenneth Ross Crosher, William Charles Dolan, John Waldron Egan, Ivan Lonsdale Farman, John Koehler Gerhart, Robert William Goetz, Francis Hopkinson Griswold, Clarence Frank Hegy, Harry Whitfield Howze, Daniel Webster Jenkins, Maurice Warren Judd, William Leroy Kennedy, Curtis Emerson LeMay, Earle Thomas MacArthur, Jr., Harold Loring Mace, Robert Shuter Macrum, Louis Ellis Massie, George Brinton McLellan, Philo George Meisenholder, William Courtney Mills, William Richard Morgan, Winslow Carroll Morse, Charles L. Munroe, Jr., Sidney John Nelson, James Presnall Newberry, Norman Bert Olsen, Elder Patteson, William Marshall Prince, Charles Francis Pugh, Louis Murray Rawlins, Jr., Samuel Oswald Redetzke, Stoyte Ogleby Ross, John Paul Ryan, Llewellyn Owen Ryan, William Alexander Schulgen, Albert Wynne Shepherd, Herbert Henry Tellman, Hanlon H. Van Auken, Louis Adolph Vaupre, Casper Perrin West, Daniel Beckett White, Roy Thomas Wright, and Stuart Phillips Wright.

New Air Corps Primary Training Classes

Two hundred and thirty-nine students were scheduled to begin training March 1 at the two primary flying schools of the Army Air Corps at Brooks Field, San Antonio, Texas, and March Field, Riverside, Calif.

Airplane Flood Relief Work of 38th Division Aviation, Indiana National Guard

By G. M. Frenzel

IN THE middle of January the Wabash River, usually a well behaved stream, took a sudden notion to step out of its banks. Alternate freezing and thawing caused the formation of ice jams which flooded the lowlands above and round the river with slush, ice and water. Before any one realized what was happening the flood had covered hundreds of square miles of territory from Vincennes, Ind., to the mouth of the Wabash River and thousands of people in the lowlands were marooned without food, fuel or clothing.

The 38th Division Aviation received the first call from Adjutant General M. G. Henley for planes to be sent to bomb the ice jams above Vincennes. For this purpose 100 pound demolition bombs were required and none were nearer than Rock Island Arsenal—too far away for immediate action.

On January 17th Lieut. M. J. Carpenter of the 113th Obsevation Squadron, 38th Division Aviation, was sent to make a special patrol and survey of the flooded areas. The details of this survey were requested by the Red Cross and civil authorities of Vincennes. H. B. Williamson, Director of the Red Cross, had already established relief headquarters at Vincennes.

A second mission was dispatched on January 23rd to make a survey of the Crowleyville-Becker School House-Griffin Area, for the purpose of locating families on whom no reports had been received since the isolation of this area. This flight, made by Lieut. P. A. Zartman, definitely established the fact that there were fifty or more families isolated in this district. Panels and panel codes with instructions for use were dropped to the communities in the flooded area.

On January 24th, Lieut. Cecil F. Reynolds made a patrol of the area and located two panels requesting food. He immediately flew back to Vincennes, secured bags of food and returned, dropping them to the families who had displayed distress signals.

On the same day, Major Richard F. Taylor, commanding the 38th Division Aviation, with Adjutant General M. G. Henley made a personal survey of the flooded area. They found great numbers of isolated families and upon landing at Vincennes learned of serious illness at Black Oak Ridge. Before returning to Indianapolis, Major Taylor flew Dr. M. L. Curtner to Black Oak Ridge where seventy-five people were marooned in an old school house, several of them seriously ill. After making a back yard landing on the side of an ice covered hill, and leaving Dr. Curtner to administer relief to the sick, Major Taylor returned to Vincennes and then to Indianapolis with General Henley.

Due to the distance from Stout Field, Indianapolis, to the scene of the flood, it was decided to send a flight of the 113th Observation Squadron to Evansville, Ind., and to conduct operations from that point.

On January 25th, one flight of the 113th Observation Squadron, consisting of three officers and two enlisted men with three O-2H planes proceeded to the advance base at Evansville, Ind. This flight was accompanied by Lieut. D. D. Watson of the Air Corps, instructor of the 38th Division Aviation.

Upon arrival at the base a conference was held with Mr. Williamson of the Red Cross, at which plans were organized. The flight was to make a survey of the entire flood area, locating isolated families and communities, establish contact by means of panel communication, and drop foods, medicine, clothing and other necessities. These articles, in proper containers were furnished by the Red Cross.

The flight was completely organized and ready for operation on the morning of January 26th. A complete survey from Shawnetown, Ill., to Vincennes, Ind., was made, which disclosed that a large number of people were isolated, and in many instances had been forced to move from their homes to barns and other buildings on higher ground. The condition appeared to be worse on the Illinois side of the Wabash. This survey gave the first indication of the magnitude of the task confronting the relief authorities.

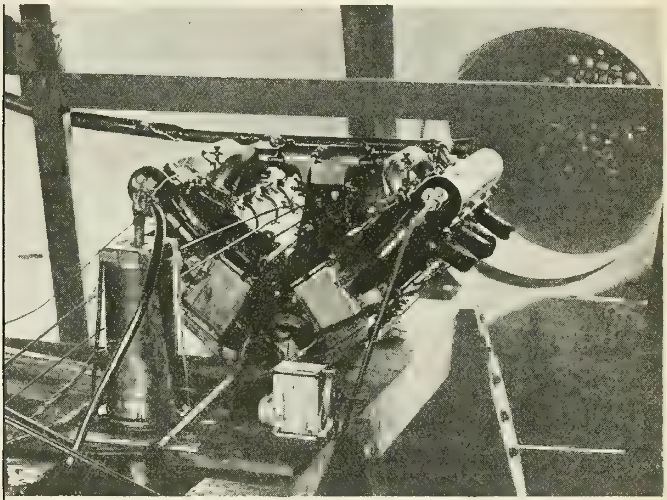
On January 28th, the area was divided into two zones, the northern area, securing supplies from Vincennes, Ind., and the southern area, securing supplies from Evansville. After January 28th the dropping of food, clothing and medical supplies continued daily until the evening of February 8th, when it became possible for ground relief to penetrate into the affected areas. Following a general summary of airplane operations for the period. Most of the patrols were made during sub-zero weather.

Total missions flown, 108; total flying time, 129 hours, 50 minutes; National Guard personnel on duty, 7 officers 3 enlisted men; total sacks of supplies dropped, 426; total number of planes at peak of operations, 5—3 Douglass O-2H, 1 Douglass O-2K, 1 O-17. A number of additional flights were made which included ferrying physicians into and out of the flooded areas, and the delivery of special and bulky articles.

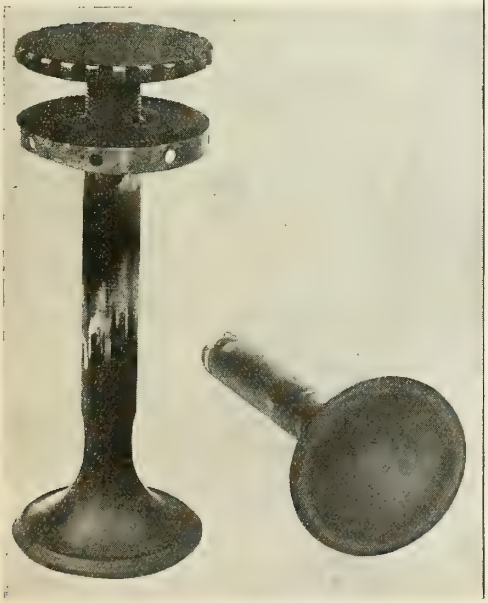
Thompson Valves from Famous Cylinders

(This advertisement is one of a series showing Thompson Valves from some of the historic aero motors that used them in setting new world's endurance records)

...from the Wright E-2 300-hour Motor-1921



The famous Wright E-2 motor that established a world-wide endurance record in 1921, mounted on government testing stand.



A photograph of two Thompson Valves after running 300 hours in the Anacostia test of 1921.

A WORTHY forerunner of modern world's record endurance flights was the venerable 180 H. P. Wright E-2 motor which survived the historic 300-hour full throttle block test by the United States Government at Anacostia, D. C., in the spring of 1921.

Two of the Thompson Valves which contributed to the remarkable ruggedness of this pioneer motor are shown on this page, exactly as removed at the end of 300 hours.

The performance of Thompson Valves at Anacostia was among the first of many endurance records that have influenced aeronautical engineers to install Thompson Valves in 95% of all American-built aero motors today.

THOMPSON PRODUCTS, INCORPORATED
General Office: CLEVELAND, OHIO, U. S. A.
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TP
TRADE MARK

Thompson Valves

WESTERN NEWS

RADIO and LIGHTING on W. A. E. LINES

SETTING a precedent among air transport operators, Western Air Express is establishing its own night lighting system on the Los Angeles-Kansas City airway, as well as its own radio system covering all the routes flown over by its planes. The Western Electric Company will supply all radio telephone equipment for radio communication on W. A. E. planes according to a contract recently signed by the two organizations. Contracts have been awarded and construction has started on the first section of the airway lighting system.

Announcement was made February 26, by Herbert Hoover, Jr., chief of radio communications for Western Air Express, that the company had placed with the Western Electric Company one of the largest orders for airplane radio equipment ever given. Nearly $200,000 will be spent immediately for radio equipment, with additional amounts later for equipment on subsidiary lines. Work will be started immediately on equipping twenty-nine ships of Western Air Express and seventeen ground stations with the most modern equipment embodying the latest engineering improvements produced in the radio industry.

The radio system projected by Western Air Express will be used to direct flying operations on all airlines of the company now in operation, covering the entire Southwest. Ground stations will be located at Los Angeles, Calif.; Kingman, Arizona; Holbrook, Arizona; Albuquerque, New Mexico; Amarillo, Texas; Wichita, Kansas; Kansas City, Missouri; Las Vegas, Nevada; Salt Lake City, Utah; and Oakland, Calif. The services of these stations will be available for communication or weather reports to all itinerant fliers passing over the routes.

"The Western Air Express radio equipment on planes will provide for automatic operation from the cockpit," Mr. Hoover said in his announcement. "Pilots and co-pilots will be able to carry on continuous telephone conversations directly with the terminal and intermediate fields of the company as they fly over the various routes. The weather broadcasts and radio beacon service of the Department of Commerce will also be made use of by pilots in flight.

"Regarding the equipment, ground transmitters are crystal-controlled one hundred per cent modulated, and the airplane transmitters are also crystal-controlled and completely modulated.

"The equipment has been specifically designed for airplane use and therefore weight and space have been kept at an absolute minimum commensurate with reliability of performance. The total weight of the sending and receiving apparatus is approximately 150 pounds. It occupies a small space in the rear of the plane. Western Air Express is operating on a frequency of 3,070 kilocycles in accordance with the plan recently adopted by the Federal Radio Commission for the air transport industry."

The Western Electric airplane equipment which will be mounted in all W. A. E. planes consists of a short-wave receiver, a 50-watt radio telephone transmitter, and a long-wave receiver for the Department of Commerce weather and beacon services. The ground stations are 400-watt radio telephone transmitters, together with the necessary receivers and power. The wave length used is approximately ninety-seven meters and the reliable range of communication is 125 miles under the least favorable conditions, according to the statement made by Mr. Hoover.

In this equipment trailing wire antennae have been eliminated from the planes and an arrangement of wires between wing tips and fuselage has been substituted, thereby making communication possible while the ship is flying or on the ground. Western Electric equipment is to be installed on all of the mail and passenger transports of the company now in operation, and also on the five 32-passenger Fokker planes which are to be put in operation in the near future.

The development of the night lighting system of the LosAngeles-Kansas City airway has begun with lighting installation on the Daggett-Seligman route. With this work done the entire airway 1,420 miles in length will be lighted for night flying, with the exception of the link between Seligman and Gallup. Beacons will be established over this 200-mile stretch before the end of the summer, according to plans recently announced by C. C. Cole, superintendent of operations for the company. Seven beacons of 2,000,000 candlepower each will be spaced thirty-eight miles apart on the Daggett-Seligman section. The beacons are to be of the standard revolving type mounted on towers fifty-one feet high. Red course lights will be mounted on each side of the beacons. The cost of lighting this 245-mile stretch will be $30,000.

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The lighting work is being done in conformance with specifications of the Department of Commerce, and the Federal department will take over the operation of the airway equipment after it has been installed. The Government will employ attendants and pay the salary of a mechanician to keep the lights in working order, according to a statement of the Airways Division, Department of Commerce.

The plan for these radio and lighting systems are designed to further develop the broad system of airlines which has been built up by Western Air Express. The company has flown more than 5,000,000 miles without injury to a passenger. Western Air Express and subsidiary airways operate from Los Angeles to San Francisco and Seattle; Los Angeles to Kansas City; Los Angeles to Salt Lake City; Los Angeles to El Paso and Dallas; Cheyenne to Denver. Pueblo, Albuquerque and El Paso; Pueblo to Wichita; and from Los Angeles to Agua Caliente and Catalina Island. The company flies 14,000 miles a day over 6,000 miles of airways. Following is a list of the yearly totals of scheduled travel flown by planes of the organization; it shows the extent of growth in the activities of the company:

Year	*Miles*
1926	328,892
1927	468,329
1928	946,660
1929	2,216,610

ABBOTT PARACHUTE

A NEW type parachute has been constructed and tested by Lieut. Col. Harry Abbott, chief pilot of the Berkeley Aviation Services, Ltd., at Berkeley, California. The parachute measures thirty feet in diameter and is pear-shaped. This latter feature is said to give it good maneuverability and quick opening. A seat type pack is used. The test parachute was made of linen. Its weight is approximately twenty pounds.

Colonel Abbott, son of Major Wayne Abbott, pioneer parachute designer and aeronaut, tested the parachute in a 2,500-foot jump near the Berkeley airport. Colonel Abbott designed the parachute for use in student instruction work.

BETWEEN Oakland Municipal Airport and San Francisco's Ferry Building now run powerful, fast scout cruisers, spanning the thirteen-mile distance in twenty-seven minutes, an average of about thirty

(Continued on next page)

Here is The Oil for Your Airplane Motor

APPROVED by the ENGINE MANUFACTURER

LUBRICATION CHART for AIRCRAFT ENGINES

MOTORS

RICHLUBE

100% PURE PENNSYLVANIA MOTOR OIL

100% PURE PENNSYLVANIA OIL

RICHLUBE

AVIATION MOTOR OIL

LOOK *for this . . .*

RICHLUBE LUBRICATION CHART

You'll find it at airports everywhere . . . . . . a guide to safe, dependable aircraft engine lubrication carrying the grade recommendation of every engine manufacturer. Get this chart for your own hangar . . . . . . it's free on request. Address the Aviation Department, Richfield Oil Company, Richfield Building, Los Angeles, Calif.

RICHFIELD

(*Continued from preceding page*)

miles per hour. Passengers destined for planes which use the airport may thus save the long-way-round trip by ferry and bus between the two points. Negotiations are under way for the carrying of air mail bound for the airport.

Airtech Inaugurates Cross-Country Formation Flights for Advanced Students

THE first of a series of extended cross-country flights scheduled by the Airtech School of Aviation was conducted from San Diego to Phoenix, Ariz., and return during February. With the recent Department of Commerce amendment to school regulations permitting formation flying of advanced transport students, Airtech has scheduled a series of cross-country flights in which all planes fly in close formation.

The first flight to Phoenix was composed of a squadron of four planes, each ship being flown by an Airtech transport student. The itinerary provided leaving San Diego during the afternoon, flying to Calexico for an over-night stop, then proceeding to Phoenix the next day, where the planes were based for the night at the Municipal Airport. The return flight was made direct to San Diego on the third day. During the trip a total of thirty-four airplane hours was registered, with the combined mileage of the ships being set at 2,700 miles.

On the Phoenix flight, students participating were Seabury Cook, Erroll Von Tempsky, Rufus Spalding and Charles MacKenzie. Flight instructors Earle Mitchell and Roy Pemberton accompanied the flight with John Van der Linde, chief mechanic, and W. A. Speer, sales manager.

Earle Mitchell, chief pilot at Airtech, stated that the training received by the students on this flight is of great value. The terrain covered in the flight gave the students opportunity of experiencing the conditions met in flying over practically every type of terrain in the United States. Leaving San Diego at sea level, the planes climbed to an altitude of 8,000 feet over the Laguna Mountains, then dropped down to an altitude below sea level close to the Salton Sea, then continued on to Calexico and Phoenix, flying low over the desert.

The next cross-country formation flight for Airtech is scheduled for a trip from San Diego to the San Francisco Bay region and return. On this trip the three planes participating will cover a total distance of slightly over 3,000 miles.

The BUSINESS of BUILDING MODEL PLANES

AIRPLANE model building unquestionably exceeds in importance and popularity all other avocations of American youth, and it has attracted legions of adherents throughout the nation—young men who take their aviation, and, in particular, their model building, very seriously. To most of them it is neither a hobby nor a fad, but a serious and most interesting occupation, and the careful nature of the labor expended is reflected in the surprisingly high quality of their products.

From this great school of practical education in the principles of aircraft construction, Louis Proctor graduated last year with honors, by winning the 1929 national airplane scale model contest sponsored by the *American Boy*, and with it the award of a trip to Europe, offered by AERO DIGEST. But young Proctor decided that he liked his model building avocation well enough to make a vocation of it, and consequently, he applied for and secured a position as a model maker with the Boeing Airplane Company of Seattle. He found that a model department occupied an established position in the production organization of this airplane factory, and that for the past two years, Othello Dickert, a master of the art of producing dimensionally perfect miniature airplanes, has been engaged in building models of the various Boeing planes, and Proctor is now working under the expert tutelage of Dickert.

Proctor characterizes his work at the Boeing plant as both interesting and difficult. Dimensional accuracy requires an unusual degree of care as well as proficiency. The model department is equipped with precision tools, fine scale measuring instruments and other apparatus to enable the model maker to achieve the essential accuracy in his product. Proctor, who is now becoming skilled in the use of this equipment, finds it makes possible the fashioning of a model with accuracy he had never previously realized.

Proctor and Dickert are now engaged in producing a series of Boeing airplane models for the company's historical record. Twenty-four of these scale models, each one-fortieth of the original plane's dimensions, are to be built, and the two model builders have already completed several. The scale models are finished in the colors of the original airplanes, and are built of hard maple. Approximately one month is required for the completion of one of the miniature airplanes. Scale models are an important item at the Boeing plant, for they are used for both historical and exhibition purposes.

Another type of model built in the model department of this aircraft factory is of even greater importance than the exhibition type. This is the wind tunnel model, by far the most difficult kind of model to construct. When a new type of airplane is designed, closely scaled blue prints are drawn up for the model builder, from which he builds up a model as nearly exact as possible. Accuracy in this type of model building is of paramount importance, for upon the results of the tests conducted with it depends the decision regarding production on the new design. If, for example, an experimental airplane were built at considerable cost from the blue prints and it developed that the plane was not practical or that its performance did not justify production, the expense to the company would be great.

By constructing and testing wind tunnel models, engineers are able to forecast definitely the performance of an actual airplane built from the plans, and if the tests of the wind tunnel model are unsatisfactory, plans may either be altered or discarded. In either case the expense of constructing a regular airplane has been avoided.

These models are built up of laminated hard maple, and two months are required for the completion of one. The wing of the wind tunnel model must not vary more than .003 inch from the dimensions of the plans. As yet, Proctor has not undertaken this type of model work.

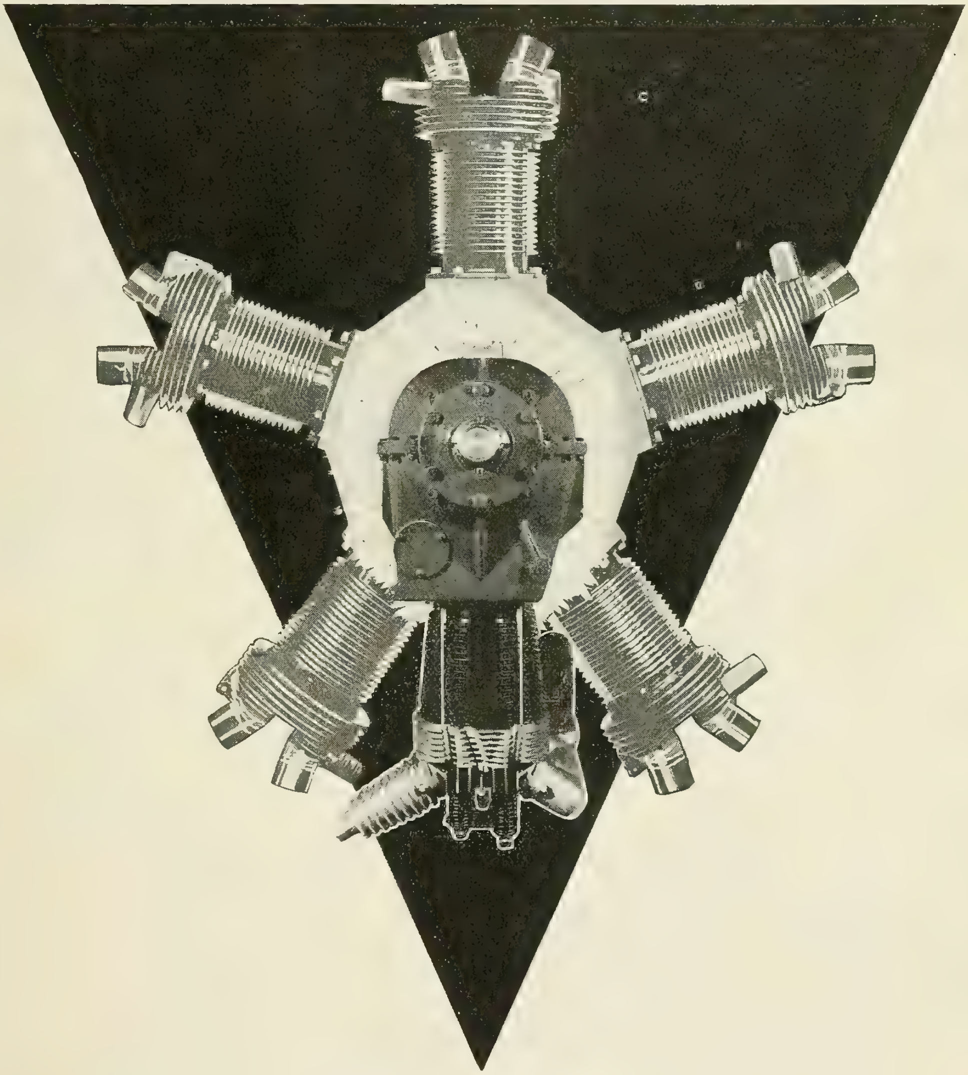
Asked what he expected to gain from his model building work, Proctor replied:

"Model building is interesting and difficult. It's also a valuable education, for one learns the general principles of airplane construction—how planes are built and why they are built that way. It's really a general education in aeronautical engineering, and that's what I'm aiming for. Like Dickert, I want to get into the engineering department of this company. When I won the contest last summer, I decided to enter the field of airplane manufacture, and I haven't changed my mind.

"I don't think I'll give up building models even when I become an engineer. I get a big 'kick' out of building a scale model, and I believe if one has an idea for a new airplane, it would help a lot to build a model of it and see what it looks like."

Othello Dickert and Louis Proctor at work in the Boeing model airplane shop

EQUAL POWER IN PROFILE



THE MENASCO PIRATE ENGINE

Rated by Dept. of Commerce—
90 h.p. at 1925 R.P.M.

WRITE FOR PARTICULARS
MENASCO MOTORS, INC.
6718 McKinley Avenue,
Los Angeles, California

CONTACTS

[F. E. SAMUELS]

I CALLED recently at the plant of the Timm Brothers Aircraft, and had an opportunity to look over the six-passenger-and-pilot cabin plane nearly completed by the Timm organization. Being built to conform to Army specifications, it is a ruggedly built, roomy ship with two Wright Whirlwind engines. The fuselage is of steel tubing construction. The landing gear is unusually wide and of great strength. The cabin is equipped with lavatory and a baggage compartment, and the pilot's cockpit is equipped with the latest instruments.

ANOTHER of the de luxe trimotor custom-built Bach Air Yachts has just been completed at the Bach plant. To say that it is a beautiful job is putting it mildly. The furnishings are elaborate and the color scheme throughout is most effective. Bach is now making a specialty of these custom-built jobs for the discriminating private owner and for the traveling business executive.

THE Emsco Aircraft plant is a hive of activity just now. A large force of mechanics is employed on the different types of planes being manufactured by the Emsco company, and the plant is equipped with the latest and best machinery—jigs, testing stands and other equipment. Mr. E. M. Smith, owner of the organization, has built a plant that, for efficiency and all around working conditions, is ideal. As an auxiliary to the plant, he has built a large private airport adjoining, from which all test flights of his planes are made.

A TRIP through the plant of the Gruss Air Spring Company with R. S. Waugh, manager of the aviation department, was a revelation to me. Situated as it is in the industrial section of the city, the company now has facilities to turn out their product on a large production basis. A big Government order for airplane shock absorbers has made necessary a production increase to keep ahead of the orders coming in from the commercial airplane builders. The machinery in the plant is all of the latest type.

I NEXT made a trip through the MacClatchie plant, where "Panther" L-head airplane engines are now under construction. Mr. Howard E. Signor of the aviation department piloted me through the works, where in the past Mr. MacClatchie has so successfully manufactured his oil well machinery. New buildings are being erected to house the production of the engine.

AT THE Los Angeles Airport, Mr. A. E. Hastings inaugurated the first glider school to be operated at a major Los Angeles airport on February 7. Mr. Hastings is sales representative for W. H. Bowlus, San Diego glider manufacturer who holds the American glider endurance record. Mr. Hastings states that he located his school at the municipally operated airport on account of its excellent air conditions and landing facilities.

AT THE Continental Airport on Mesa Drive, it was a pleasure to meet Mr. W. A. Denehie, who has just started a flying school at the airport to be known as the Continental Air School. Instruction for private and limited commercial pilots will be featured. A ground school course will be included in the school. Curtiss Robin planes will be used for student training.

THE Aero Corporation of California reports having just renewed its contract for the distribution during 1930 of Fleet airplanes. Since the original contract was made, late in 1929, Aero Corporation has sold five of these little training planes and has an order in for three more with the Fleet Aircraft Corporation.

AT THE new million dollar terminal of the Western Air Express on Valley Boulevard the grading crews are nearing the end of their work in front of the passenger depot, and landscaping is to be started shortly. The finishing touches are being put on the different buildings, and the great air terminal is fast becoming one of the leading airports of the West Coast.

Another Railroad Joins T. A. T.-Maddux

THE Southern Pacific Railroad has arrived at an agreement with the T. A. T.-Maddux organization regarding local connections for the transcontinental air route. Special trains will connect at airline stops with planes bound for Los Angeles, San Francisco and Agua Caliente, Mexcio; tickets for the entire journey being sold by the railroad.

The Sunburst Neon Beacon

ALTHOUGH few details are available, it is generally understood that a distinctly new type of neon beacon is being developed by a Middle Western lighting concern. The tubes are arranged to give the effect of interlocking, which is accomplished by placing twenty-four tubes in a horizontal position and eight tubes in a vertical position in each section. All of the tubes are placed three inches apart and set in front of a chromium-plated reflector.

CALIFORNIA

A CONTRACT to use gasoline and oils produced by the Richfield Oil Company of California exclusively during the next five years was recently signed by Mid-Continent Air Express, according to an announcement of C. M. Fuller, president of the Richfield company. Mid-Continent Air Express operates 14-place trimotor Fokker planes between Dodge City, Kan., Wichita, Kan., Pueblo, Colo., and Albuquerque, N. M.

A course in aeronautics has been added to the regular curriculum of senior high schools and junior colleges in California, according to a recent announcement of Vierling Kersey, Superintendent of Public Instruction in the state. The course given in the schools embodies a general study of aviation including technical aspects and present business methods, and was prepared by Prof. Earl W. Hill, educational director of Western Air Express and instructor in Commerce at the University of Southern California.

STANDARD AIRLINES, INC., completed the first year of operation of its Los Angeles-El Paso airline on February 4. During the year planes of the company flew an estimated distance of 500,000 miles. The route was inaugurated by Standard Airlines as the western link in an air-rail transcontinental passenger and express transport service to be operated in conjunction with the Texas and Pacific Railway. During the year Standard Airline planes maintained a 97 per cent schedule of operation.

SAN DIEGO and El Centro, Calif., were scheduled to become regular stops on March 1 on the Los Angeles-El Paso division of Standard Airlines, Inc. This route of Standard Airlines is the western link in its transcontinental air-rail system and San Diego and El Centro will be regular stops on this service. Planes operated on the service and stopping at San Diego will land at Ryan Field until the completion of Lindbergh Field, San Diego, where operations will be moved when development of this field is completed.

TWO-THIRDS of the commercial airplane engines of from 76 to 125 horsepower manufactured in the United States during 1929 were produced by the Kinner Airplane and Motor Corporation of Glendale, Calif., according to a recent announcement of officials of the Kinner company. There were 1,309 airplane engines within this horsepower manufactured during this period, of which 865, or 66.1 per cent, were made by the Kinner company.

The Kinner K-5 100-horsepower engine was recently tested at Wright Field, Dayton, Ohio, according to the announcement, and received the approval of the United States Army Air Corps.

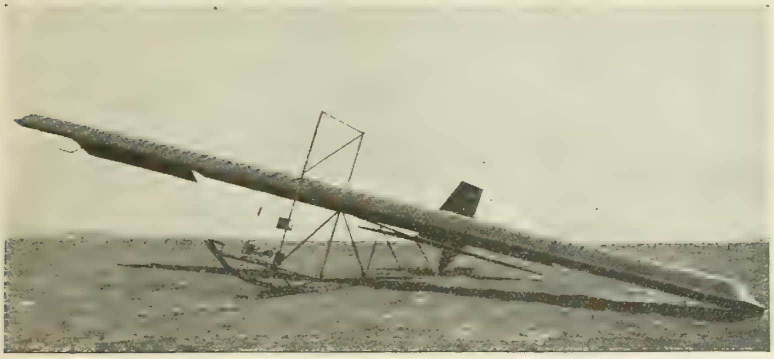
THE sale of twelve Parks training biplanes to the Berkeley Aviation Services, Incorporated, of Berkeley, California, has been announced by Ray W. Brown, sales manager of the Parks Aircraft Division of the Detroit Aviation Corporation. The sale was made by W. A. Hansley, western sales representative.

DEDICATORY ceremonies of the airport constructed between Coachella and Indio, Calif., under the auspices of the Cochella Valley Lions Club, were held on February 22. Army Air Corps officials stationed at March Field and officials of commercial air transport companies participated.

The field is located on the Southern Transcontinental Highway leading to Yuma, Arizona, and borders the Great American Desert about one hundred miles south of Los Angeles, Calif. There are two runways, one 3,000 feet in length and the other

(*Continued on page* 150)

EVANS *all steel* GLIDER



Safe
Durable
Airworthy
Economical

$247.50 Knockdown

Valuable
territories
are open
for
well qualified
DISTRIBUTORS

SPECIFICATIONS:

Primary type

Span	34 ft.
Cord	5 ft.
Weight	150 lbs.

Fuselage—welded tubular steel.
Empennage—all welded steel, fabric covering.
Wings—Aerotrus steel ribs, spruce spars, fabric covering.
Airfoil—Gottengin 441 (high lift).

Price — knockdown, $247.50; assembled, $347.50.
(f. o. b. Los Angeles)

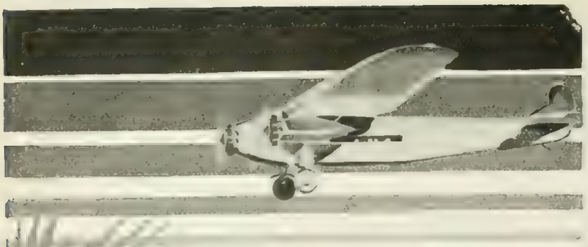
The superior airworthiness and maneuverability of EVANS gliders were emphatically demonstrated in the recent All-Western Glider Meet, where EVANS gliders won seven out of twelve places in primary type glider events . . . including first, second and fourth places in spot landing contest. These Gliders are built to gixe maximum safety, high performance and freedom from maintenance.

Spars and seat are the only parts constructed of wood. The fuselage, welded by licensed aircraft welders, is of high grade aircraft steel—completely finished. Aerotrus steel wing ribs come complete, ready to slip on spars. Fabric is sewed ready to pull on wings and dope. Bolt wings and tail surfaces to fuselage and rig for flying. All parts and materials with detailed instructions for assembling are included.

By buying your EVANS glider knocked-down, save $100.00 in cost and approximately 50% on freight charges. Order your glider now for spring training and be ready for participation in the coming glider events. 20% deposit to insure delivery and your glider starts on its way.

EVANS GLIDER COMPANY

Beaux Arts Building
Los Angeles, Calif.



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invite you to learn to fly at STANDARD

EVERY newly licensed pilot anticipates capitalizing on his flying knowledge. At no other flying school in the country is the transport graduate student so truly in line for a well paying position. Airline pilots are receiving $400.00 a month and up.

STANDARD is the largest U. S. Government Approved flying school in the West. Its equipment is the best money can buy—Fokkers and "U. S. Navy Training" Fleets. Its instructors have a record of 1500 students safely trained.

Liberal Finance Plan

The course of instruction, whether for Private, Limited Commercial, or Transport is "Government Approved" and thoroughly complete. It is the outstanding ability of STANDARD TRAINED graduates that has placed this school in the enviable position of PILOT CONTRACTORS to—

WESTERN AIR EXPRESS, MID-CONTINENT AIR EXPRESS, WEST COAST AIR TRANSPORT, STANDARD AIRLINES, FOKKER AIRCRAFT CORPORATION.

Here in the Los Angeles district where 300 days yearly of warm sunshine lends to economy in training time and flying equipment, you can learn speedily and in perfect comfort. This county has 59 airports, 4 transcontinental air-rail lines, as well as 19 aircraft manufacturing plants.

Your chance to learn and earn is in Los Angeles.

STANDARD *FLYING* SCHOOLS

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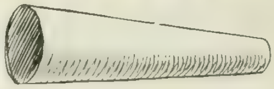


Large and durable, with reenforced grommets for lacing. Made of specification cotton material.

SIZE:	Natural White	Orange Yellow
8 ft. long by 20 in. dia. at large end.	$6.00 Each	$7.50 Each

Size: 12 ft. long by 36 in. dia. at large end
Natural White $8.00 Orange Yellow $10.00

GENUINE RUSSELL PARACHUTE

SILK MUFFLERS FOR COLD WEATHER

A useful addition to any man's wardrobe. Soft, comfortable, dressy and warm. It really keeps out the cold. Generous size, 2½ yds. long by 30 ins. wide. Made of seamless, first-quality natural white Parachute silk.

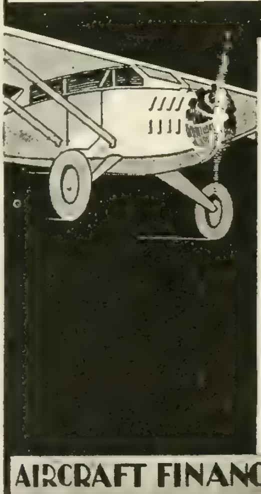
$6.00

Same quality and size, with cross seams **$3.00**

Satisfaction Guaranteed
Write Direct To

RUSSELL PARACHUTE CO.
1202 Kettner Blvd. San Diego, Calif.

AIRCRAFT INSURANCE



Life . . Fire . . Theft . . Cargo
Property Damage . Windstorm
Compensation . . . Accidental
Damage . . Personal Accident
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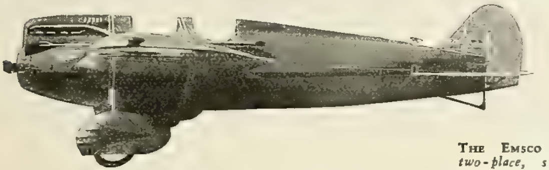
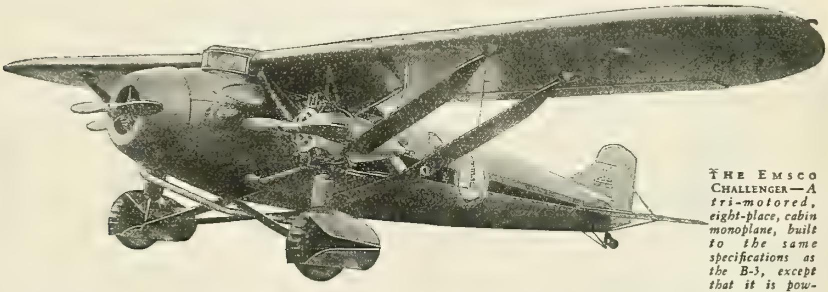
EMSCO

A COMPLETE LINE OF AIRCRAFT FOR LAND AND SEA



The Emsco Cirrus—*A two-place, sport and training, mid-wing monoplane, powered with a 95 h.p., four-cylinder, air-cooled American Cirrus motor.*

The Emsco B-3—*A single motored, eight-place, cabin monoplane transport that may be powered with a Wright 300, a Pratt & Whitney Wasp or Hornet engine.*



The Emsco Challenger—*A tri-motored, eight-place, cabin monoplane, built to the same specifications as the B-3, except that it is powered with three Curtiss Challenger engines of 170 h.p. each.*

EACH A LEADER IN ITS CLASS

Engineered on sound principles that have been proven by years of experience in commercial and military aeronautics.... Built by master craftsmen in a new $1,000,000 factory equipped with the most modern approved production methods.... These three types of Emsco Aircraft are proving every day their superiority in providing safe air transportation with greatest economy.

The Emsco Cirrus has flown cross-country under normal flying conditions with a fuel consumption of only 4.8 gallons per hour at cruising speed. Twice the 3-B, powered with a 300 h.p. Wright Whirlwind has taken off a gross load of approximately 10,000 pounds with a run of a half mile. The Emsco Challenger has demonstrated its dependability, safety and economy by flying more than 25,000 miles under all conditions, within the last four months.

In addition to these, the Emsco Aircraft Corporation has under construction at this time four new and distinctive types of planes, which, when completed and added to the present group, will make the Emsco line one of the finest and most complete in the industry today. These four include:

(1) a four motored plane carrying thirty-two passengers, two pilots and radio man; four Wasp motors—tandem; designed for all weather conditions and altitude flying, also offering economical transportation.

(2) The Emsco Amphibian—a bi-motored eight place, streamline; metal designed; built for heavy duty transportation.

(3) The Emsco Mail—a single motored monoplane; built for mail, express and freight; fast performance with a pay load of 1200 pounds.

(4) A special long range monoplane—extremely streamlined; designed for record distance flight.

All Emsco land planes are delivered from the factory with pontoon fittings so that no structural changes are necessary to quickly adapt them to seaplane work. The B-3 may easily be transformed into a tri-motored plane as fittings for outboard motors are standard. Structurally the planes are identical.

Complete specifications, performance data and prices will be forwarded on request.

EMSCO AIRCRAFT CORPORATION ◆ DOWNEY ◆ LOS ANGELES COUNTY ◆ CALIF.

(*California News continued*)

2,200 feet. The field was constructed particularly for the use of planes flying south and west of Los Angeles.

CONSTRUCTION of a sign 379 feet long with letters fifty feet by ten feet has been completed at Pasadena, Calif., to identify the city from the air by the Pasadena American Legion Post No. 113. Erection of the sign was included in the program mapped out by the committee of aeronautics of the organization.

The sign is located on the water reservoir in Pasadena near the city hall, and forty-seven gallons of white lead were required to paint the letters. The sign is visible from a high altitude.

A TOTAL of 74,000 miles in three and one-half months of commercial flying is reported for a trimotor Ford transport used by the Continental Air Express which operates passenger planes between Los Angeles, Taft, Coalingo, Fresno and San Francisco.

The plane is a 4-AT, eleven passenger transport, equipped with three Wright Whirlwind engines. It has been averaging eight hours of flying a day, the only interruption being a lay-over for change of motors after every 350 hours of flying. Before being placed on the Western run, the ship had been flown by an Eastern operator. Despite its original mileage, it is in perfect condition, according to Harry Sperl, of the operating company.

A PLAN for financing airplane sales in Southern California was recently announced by Robert A. Trow of the aviation department of Behrendt-Lévy Insurance Agency, Los Angeles. The insurance firm will finance the unpaid balance on new aircraft up to 66 2/3 per cent of the purchase price plus insurance of the finance company's interest against fire, windstorm, theft, and accidental damage. Monthly payments on the unpaid balance and the insurance are carried over a period of one year.

OAKLAND

[H. V. WALDORF]

WITH its jurisdiction extending from the San Francisco Bay region to the Oregon line, the Aero Club of Northern California has been formed by Oakland aeronautic leaders. The adopted program of activities includes the sponsoring of aeronautic expositions, races, air-mindedness instruction in public schools, and a non-profit flying school for its members.

Headquarters of the club are in Oakland. Leo S. Nagle is acting president pending an election of officers.

THE Aeronautical Chamber of Commerce of America has scheduled the Pacific Coast Aeronautical Exposition to be held in Oakland from June 28 to July 6. Due to the lack of sufficient exhibition space in the downtown area, the arrangements committee of the Capt. Bill Erwin Post, American Legion, sponsors, have decided to hold the show at the Oakland Municipal Airport. To augment the hangar space to be assigned for display purposes, a large tent hangar is to be constructed between the airport hotel and the eastern boundary of the flying field.

William P. Butler is managing director of the show. Guy Turner, superintendent of the airport, is a member of the committee in charge of the exposition. Parking arrangements are to be made for 35,000 automobiles.

THE official air patrol of Oakland has been increased to nine members with the appointment of Capt. Fred T. Watson, and Lieuts W. L. Harris and John R. MacGregor. The patrol organized for emergency aerial duty was formed by Capt Henry Reynolds in 1927 and took an active part in the campaign which led to the establishment of Oakland Municipal Airport.

C. EUGENE JOHNSON and H. F. Lusk, Boeing System executives at Oakland Municipal Airport, have developed two new types of instrument boards. Mr. Johnson's suggestion has resulted in the development of an instrument board in which the indicator needles form a horizontal line when the plane is proceeding along a normal or set line of flight. Any deviation in the line of flight or in the performance of the engine will cause one or more needles to depart from the horizontal line. The main feature of this board is that several of the instruments including the altimeter, tachom-

(*Continued on next page*)

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And many other commodities comprising a complete line of AIRCRAFT SUPPLIES

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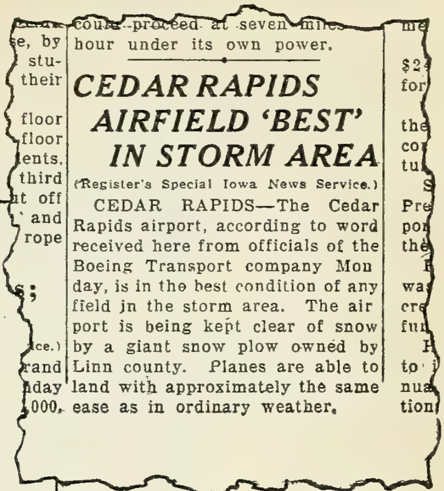
SERVICE

Let Mr. Hoare tell about it

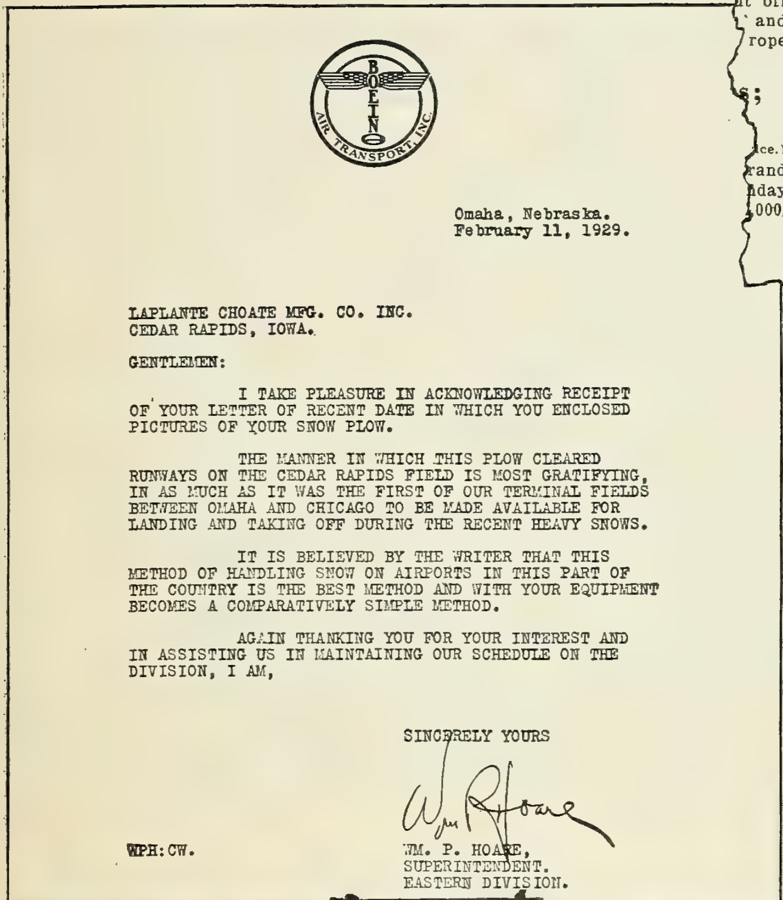


CEDAR RAPIDS AIRFIELD 'BEST' IN STORM AREA

(Register's Special Iowa News Service.)

CEDAR RAPIDS—The Cedar Rapids airport, according to word received here from officials of the Boeing Transport company Monday, is in the best condition of any field in the storm area. The airport is being kept clear of snow by a giant snow plow owned by Linn county. Planes are able to land with approximately the same ease as in ordinary weather.

Des Moines Register
Jan. 29, 1929



BOEING AIR TRANSPORT, INC.

Omaha, Nebraska.
February 11, 1929.

LAPLANTE CHOATE MFG. CO. INC.
CEDAR RAPIDS, IOWA.

GENTLEMEN:

I TAKE PLEASURE IN ACKNOWLEDGING RECEIPT OF YOUR LETTER OF RECENT DATE IN WHICH YOU ENCLOSED PICTURES OF YOUR SNOW PLOW.

THE MANNER IN WHICH THIS PLOW CLEARED RUNWAYS ON THE CEDAR RAPIDS FIELD IS MOST GRATIFYING, IN AS MUCH AS IT WAS THE FIRST OF OUR TERMINAL FIELDS BETWEEN OMAHA AND CHICAGO TO BE MADE AVAILABLE FOR LANDING AND TAKING OFF DURING THE RECENT HEAVY SNOWS.

IT IS BELIEVED BY THE WRITER THAT THIS METHOD OF HANDLING SNOW ON AIRPORTS IN THIS PART OF THE COUNTRY IS THE BEST METHOD AND WITH YOUR EQUIPMENT BECOMES A COMPARATIVELY SIMPLE METHOD.

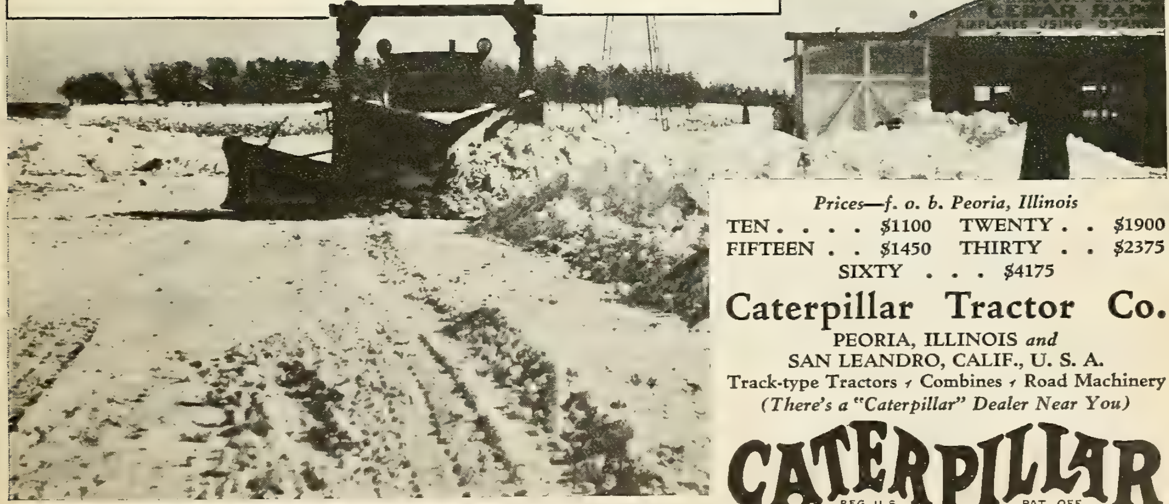
AGAIN THANKING YOU FOR YOUR INTEREST AND IN ASSISTING US IN MAINTAINING OUR SCHEDULE ON THE DIVISION, I AM,

SINCERELY YOURS

Wm R Hoare

WPH:CW.

WM. P. HOARE,
SUPERINTENDENT.
EASTERN DIVISION.



In scores of ways—winter and summer—the "Caterpillar" Tractor serves the airport.

Prices—f. o. b. Peoria, Illinois

TEN	$1100	TWENTY	$1900
FIFTEEN	$1450	THIRTY	$2375
SIXTY	$4175		

Caterpillar Tractor Co.

PEORIA, ILLINOIS *and*
SAN LEANDRO, CALIF., U. S. A.
Track-type Tractors ✓ Combines ✓ Road Machinery
(There's a "Caterpillar" Dealer Near You)

CATERPILLAR REG. U. S. PAT. OFF.
TRACTOR

(California News continued)

eter, and air speed indicator are mounted so that they can be revolved and set for any condition of flight.

Mr. Lusk's board is designed for instruction purposes. It consists of a regulation board with dummy instruments which can be set for any position. The student is then asked to interpret the position of the plane and the steps necessary, if any, to return it to normal flight.

DOWNTOWN extension schools, in which students may enroll at any time, have been established in Oakland and San Francisco by the Boeing School of Aeronautics. Classroom work of the private, limited commercial and transport pilots and mechanics' courses are given at the extension schools. Shop and laboratory work will be continued at Oakland Municipal airport. The downtown schools were established for the benefit of evening school students.

A NEW light biplane, specially designed for training and for forest patrol service, has been completed and tested by Gene Brawner and Jeff Bauer of San Francisco. The plane is a two-place model, and has a wing span of twenty-seven feet and a length over all of twenty feet. A 60-horsepower LeBlond engine is used. A feature of the construction is the extreme stagger of the wings, a total of nineteen inches being used. The gap is forty-four inches. With the completion of tests quantity production of the plane is to be inaugurated. It was constructed and test flown at Alameda Airport. The fuselage is constructed of steel tubing and aileron and tail surface controls are operated by tubes, eliminating cables. In tests the plane took off in a distance of seventy feet, and landed at approximately twenty-six miles per hour. It has a high speed of 120 miles per hour.

CUTTING the overland distance to the downtown district by more than three miles, the Hegenberger Road short-cut to Oakland Municipal airport has been completed. Nine thousand feet in length and connecting with the main artery to downtown Oakland and the San Joaquin Valley, the improvement cost approximately $65,000.

BOEING School of Aeronautics, Oakland, Calif., will construct a building which will house an engine laboratory, and will provide room for classes in welding, airplane doping, mechanical drawing, and communication instruction, according to a recent announcement of officials of the school. The building will be the second constructed in four months to accommodate an increased number of students enrolled in the school.

Included in the plans of development of the school is the construction of a wind tunnel with a maximum air speed of 75 miles per hour.

OFFICES at Oakland, Calif., and Seattle, Washington, were recently opened by Ted Schleuter, Western sales manager of the Detroit Aircraft Corporation. The establishment of the new offices is included in the plans of the Detroit corporation for the organization of a nation-wide sales division of the company.

ARIZONA

[H. G. WILSON]

A FIFTH Arizona passenger line was established by Scenic Airways during January, maintaining a daily schedule between Phoenix and Nogales, with regular stops at Tucson. Since a company has been organized to operate the line as Valley Airlines, a subsidiary of Scenic Airways, and a number of additional points have been included as flag stops. Lieut. Leslie Arnold has been associated with the company in launching the new route.

Arizona now has three cross-country services, the T. A. T. and Western Air Express in the north and Standard Airlines in the south. The fifth regular service is that of the Apache Airlines, which operates a daily schedule between the Globe-Miami district and Phoenix.

THE first glider to be obtained by any group in the state of Arizona is that just purchased by the Tucson Glider Club, which is composed of a group of boys of high school age. Money for purchasing the glider was raised by the boys themselves, chiefly through work which thev did for that purpose. They have constructed a clubhouse on a tract of land which they secured from the government and plan to erect their own hangar.

GEORGE N. WILLIAMS has been named to succeed B. R. Russell as superintendent of the International Airport at Douglas, Ariz., Mr. Russell having served since the opening of the field. He retired to promote an aviation project in Nacozari, Mexico, with the view of carrying mail and passengers between Agua Prieta, on the international line, to points in Mexico.

COL. BEN F. FLY, after whom the Yuma airport is named, was appointed by the Yuma Board of Supervisors to superintend construction of the hangar, runways and other improvements made possible by the voting of a $25,000 bond issue for this purpose. A contract for the construction of two clay runways was granted the R. E. Hazard Company of San Diego.

FORTY-EIGHT hour service between Los Angeles and Mexico City, via Nogales, Arizona, is now offered, a change in the schedule of Pickwick Latin American Airways having just been made. The service is tri-weekly. An overnight stop is made at Los Mochis, Sinaloa, which field has been improved until it is comparable with leading fields of the United States. Equipment includes a steel, electrically lighted hangar, underground storage tanks, boundary and obstruction lights and two sets of flood lights. It has two oiled runways.

PUEBLO BONITO, one of the oldest ruins in the United States, will be made available to air travelers next summer. Officials of the Albuquerque Airport are making plans to lay out a landing field near the ruins which will be one hour from Albuquerque by air. It is now a three-day trip to and from the ruins by auto. Despite this inaccessibility the ruins are one of the most popular tourist trips in the southwest and has been the scene of numerous archaelogical expeditions.

F. L. HARRISON, distributor of "Caterpillar" tractors at Albuquerque, New Mexico, has purchased a Butler three-place biplane which he uses to cover his sales territory. Mr. Harrison, who is a licensed pilot, uses the plane to visit customers and to deliver rush orders on spare parts.

(Continued on page 156)

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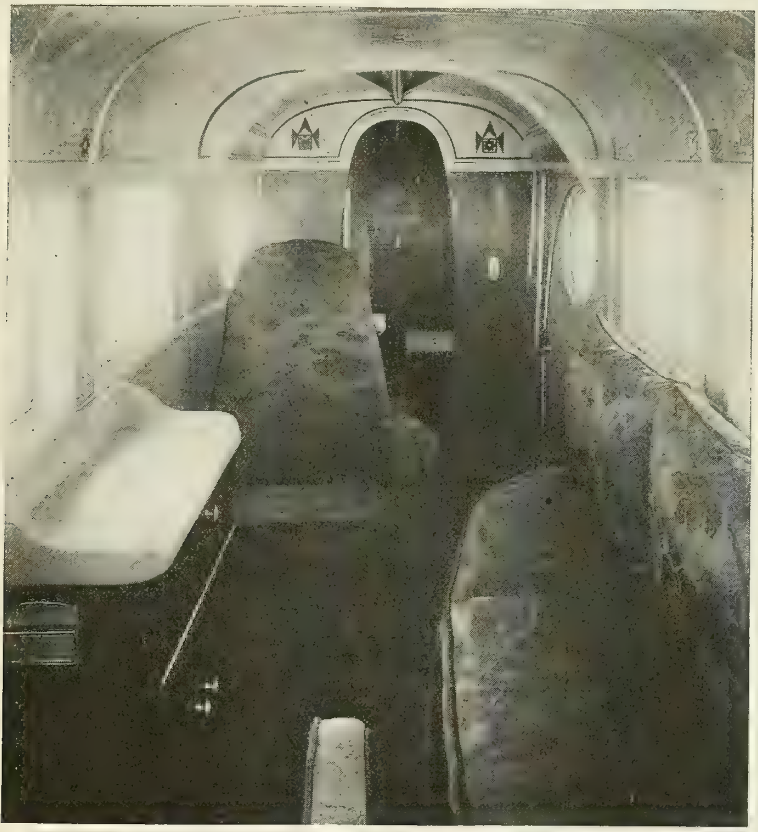

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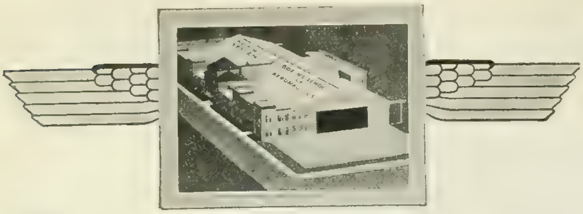

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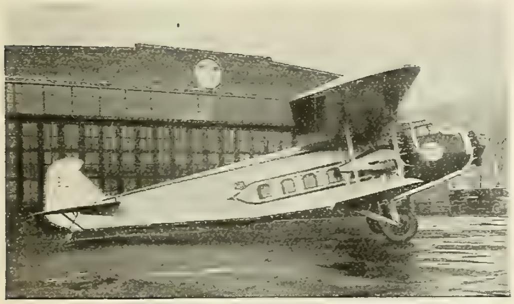

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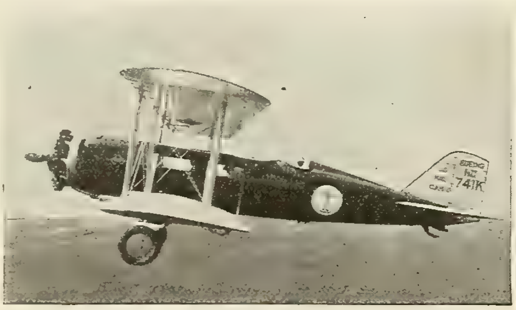

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(Arizona News continued)

territory. Mr. Harrison, who is a licensed pilot, uses the plane to visit customers and to deliver rush orders on spare parts.

COLORADO

[I. R. ALEXANDER]

PLANS for an annual Rocky Mountain region aviation meet have been advanced by the Junior Chamber of Commerce of Denver. In discussing the plans, William D. Nash, Jr., president of the junior chamber, said: "The meet would be held at the Denver municipal airport some time during the late summer. Preceding the meet we intend to have a good-will aerial cruise. This will consist of from twenty-five to forty airplanes, to visit every city in the Rocky Mountain region." A tentative outline for a corporation to stage the meet has been prepared and will be submitted to various Denver organizations for approval. To further its plan for an air meet, the junior chamber sent W. M. Ewing, Jr., to Los Angeles to study plans of the air show staged annually by the Los Angeles junior chamber.

A COMMITTEE of the chamber of commerce of Boulder, Colo., is considering means of purchasing for the city a tract of about 140 acres, northeast of Boulder, to be converted into an airport. Owners of the tract have offered it at a low price, it is said, and an early purchase is planned. The city council is expected to name a committee to work with the chamber of commerce representatives in completing the deal. Aviation experts from Denver and other cities have pronounced the proposed airport site an excellent one.

UTAH

[G. PERRINS]

PLANS are underway for the building of a modern airport at Richfield, Utah. The city has acquired option of 242 acres of land for this purpose, situated just south of Richfield and bordered by the state highway.

Alvin O. Priel, assistant airway manager of the Department of Commerce, accompanied by Mayor F. G. Martines and Councilman C. Smith, made a thorough inspection of the grounds. Ninety-nine per cent of the landings and take-offs will be made in the prevailing winds. A runway will be constructed 600 feet wide and 4,160 feet long, with a cross-runway 1,840 feet long and 600 feet wide. The cost will be $5,000.

WASHINGTON

[C. M. LITTLEJOHN]

Harold Crary, director of public relations for the Boeing companies

A MOVEMENT to secure thirty additional acres for the development of the Naval Air Base at Sand Point, Seattle, is now under way at Washington, D. C. The Seattle Chamber of Commerce and civic leaders are supporting the move for the additional land. Senator Wesley L. Jones of Washington and Representative John F. Miller, have introduced a bill providing for the purchase or condemnation of thirty more acres adjoining the field.

EMPOWERED to design, manufacture, and deal in aircraft, and to conduct a commercial flying service, the Continental Aviation Corporation of Seattle was recently incorporated by M. W. Giddings and E. R. Willard.

A LARGE expansion program has been launched by the Alaska-Washington Airways Consolidated of Seattle. Among the expansive plans are included establishment of a modern air terminal on Lake Washington, the inauguration of regular flight service in the Puget Sound region, British Columbia and Alaska; and the addition of two sixteen-passenger and a number of seven-passenger planes to its equipment. This company has just added to the board of directors Lacey Hofius, A. W. Leonard and G. W. Skinner, three business and civic leaders of Seattle.

The two new sixteen-passenger cabin seaplanes will be used on a triangular flight from Seattle, to Victoria, to Vancouver. The five to seven-passenger planes to be added for use in Alaska and on feeder lines of Puget Sound will also be seaplanes. A hangar for servicing and handling equipment will be built at Bryn Mawr, south of Seattle.

INCORPORATION of the Bryn Mawr Flying Club was recently effected at Seattle, Wash. The new club will operate ships from the Lake Washington Airport. Winifred Kastrup and Van C. Griffin were the incorporators of this new club.

FORMERLY an officer of the Royal Flying Corps, Wing Commander W. E. Wynn has joined the staff of the Alaska-Washington Airways, Inc., at Seattle, in charge of flying operations. He has also been made a member of the company's board of directors.

PATENT was secured recently by the Boeing Airplane Company of Seattle for an airplane instrument panel designed to permit the moving of the indicating hands of the air speed indicator, altimeter and tachometer to a horizontal line to indicate any given set of conditions. The rate of climb indicator is set to give a zero reading. Under any given set of conditions of revolutions per minute, air speed and altitude with zero rate of climb, all indicating hands of the instruments will drop below the index lines if the ship loses altitude. The hands go above the index line if the plane gains altitude.

BOEING Airplane Company of Seattle, Washington, has started production of ninety single-place P-12B planes for the Army Air Corps. The ships are of the Pursuit type powered with Wasp engines and are an adaptation of model P-12.

SEVENTY-TWO Wasp-powered Boeing fighting planes were included in the aircraft on board the *Lexington* and *Saratoga* which were detailed recently to the winter maneuvers of the United States Navy, according to a recent report of officials of the Boeing Airplane Company, manufacturers of the planes. Jack Harding, round-the-world Army Pilot who has been appointed liason officer for the Boeing company, will accompany the fleet for the purpose of collecting data on the performances of the Boeing planes.

L. FROELICH was elected executive vice president of the Northwest Aircraft and Motor Corporation of Seattle, Washington, at a recent meeting of the firm's board of directors. R. E. White was elected to the board of directors and appointed treasurer of the company. The corporation manufactures low-wing monoplanes and air-cooled aircraft engines.

NORTHWEST

[F. K. HASKELL]

FOUNDATION work on the airways radio station at Boise, Idaho, has commenced according to Art Johnson, assistant airways traffic supervisor of the Department of Commerce. The towers of the station will be 125 feet in height and the cost of construction will be in excess of $35,000.

AT a recent conference of King County, Wash., officials it was shown that approximately $1,000,000 has been expended already on the Boeing Field at Seattle, Wash., and that $260,000 additional is scheduled for expenditure. Eventual developments will exceed $5,000,000 in cost.

PITTMAN E. GATES of Las Vegas, Nevada, has been appointed distributor in Nevada, California and Oregon of the Cessna, Rearwin, Bird, Fleet, Laird, Flamingo and General Aristocrat planes. Mr. Gates will appoint dealers for these ships throughout the three states in his territory.

DESPITE weeks of stormy weather which badly interrupted schedules and often kept planes on the ground, 116 air passengers arrived and departed from Swan Island Airport, Portland, Ore., during January. Mail handled in and out of the airport

(Continued on next page)

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(Northwest News continued)

totaled 14,145 pounds, twenty-five transient planes registered, seventy-five students were enrolled in aviation schools on the field and twenty-four planes were registered at the end of the month.

Sheridan, Wyoming, Develops 200-Acre Airport

FOLLOWING purchase recently by the city of Sheridan, Wyo., of a 200-acre tract a mile and a quarter from the heart of the business section, the airport committee, in charge of Postmaster Homer Loucks, has started preparations to have the field completed and equipped to service ships by next summer. The field is costing the municipality $15,000, and within a year the community of 11,500 people expects to spend an additional $10,000 to surface a 3700-foot runway, install markings and put in a gas and oil service unit.

The first organized company to operate off the field will be the Sheridan Air Transport company, which plans to open a daily air service between Sheridan and Lovell, Wyo., crossing the Big Horn mountains, which are 8,800 feet in height.

ENTRANCE of the Detroit Aircraft's sales organization into the Northwest with a full line of its planes, amphibions and flying boats has been announced by W. A. Williams, newly-appointed Northwest sales director at Portland, Ore. Mr. Williams will have under his direction the Oregon, Washington, Idaho, Utah, Montana and Western Canada territory. Tex Rankin, who has distributed Ryan planes here in the past, has been named as associate dealer of the corporation in Portland.

THE Boeing Air Transport, Inc., recently received an appropriation for the construction of new depot and passenger facilities at seven stations on the Chicago-San Francisco route. Part of the appropriation will not be expended until satisfactory arrangements have been made for the leasing of airports on the route where improvements are scheduled to be made.

Boeing system has already established new quarters at Van Buren and Michigan Avenues, Chicago. The company maintains offices also in San Francisco, Calif.; Seattle, Washington; Portland, Oregon and Omaha, Nebr.

AMONG the improvements now being completed at the Burley, Idaho, airport are three runways, laid in different directions so that landings and take-offs may be made with reference to the wind. These runways will be 500 feet wide, with 100-foot graveled strip through the center and the balance leveled. Two of the runways will be 2,500 feet long, and the third will be 2,160 feet in length. Fifty-one lights will be installed. Hangars will be constructed midway of the field.

INITIAL test flights of the first model 204 six-place flying boat constructed at the new aircraft factory of Boeing Aircraft of Canada at Vancouver, B. C., were recently completed. Model 204 is similar to the same model produced by the Boeing Company at Seattle, and powered with a Wasp engine it has a high speed of 135 miles per hour, a cruising speed of 110 miles per hour, a cruising radius of 450 miles, a 750 foot take-off run, and a landing speed of 59 miles per hour.

AN air-steamer service between Seattle, Washington, Portland, Oregon, and New York City has been arranged jointly by the West Coast Air Transport Corporation and the Panama Pacific Line.

According to the schedule which has been arranged for this service, a trimotor, twelve-passenger Fokker plane of the West Coast company leaves Seattle daily at 8:30 a. m., arrives at Portland at 9:45 a. m., and departs for San Francisco at 10:45 a. m., arriving at the Oakland airport at 3:10 p. m. Transportation is then provided on one of the steamers operated by the Panama Pacific Line from San Francisco to Los Angeles and through the Panama Canal to Havana, Cristobal and New York. It has also been arranged for those desiring this service to leave Oakland airport by plane at 5:10 p. m., arrive in Los Angeles in three hours and board a Panama Pacific steamer for departure next morning.

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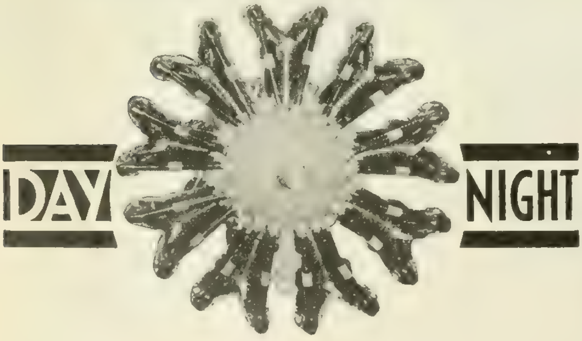

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AERONAUTICAL INDUSTRY

SCHOENHAIR SETS SIX LOAD-SPEED RECORDS IN LOCKHEED VEGA

SIX new world speed records for airplanes carrying loads were established by Lee Schoenhair in a Lockheed Vega during February in flights at Jacksonville, Fla. The flights were made over a course extending along the shore-line between the towns Mayport and St. Augustine, a distance of thirty-one miles.

Schoenhair set new world speed records of 185.452 miles per hour and 171.228 miles per hour for distances of 100 kilometers (62 miles) and 500 kilometers (300 miles) respectively, carrying a weight of 500 kilograms (1,102 pounds) in a flight at Jacksonville on February 18. He made five laps around the course, the first lap on which the 100-kilometer speed record was established being included in the five laps covered in setting the speed record for 500 kilometers.

In a flight of four hours and ten minutes over the course on February 20, Schoenhair established three new world speed records for airplanes carrying a load of 1,000 kilograms (about 2,200 pounds). He set a record of 175.997 miles per hour for the 100-kilometer course, 168.114 miles per hour for the 500-kilometer course; and 152.702 miles per hour for the 1,000-kilometer course; this latter record also broke the world's record for planes with 500 kilograms added weight over the 1,000-kilometer course.

Schoenhair's record for planes carrying a weight of 500 kilograms over the 100-kilometer course surpassed by 10.79 miles per hour the former record of 174.662 miles per hour established by Fernand Lasne at Etamps October 7, 1925; and over the 500-kilometer course exceeded by 12.572 miles per hour the former record of 158.656 miles per hour set by Capt. H. S. Broad at Stag Lane, Reading, England, April 27, 1928. The former record of 160.280 miles per hour for planes carrying a load of 1,000 kilograms over the 100-kilometer course was held by Capt. H. S. Broad; and the former record for planes carrying this weight over the 500-kilometer course was 168.656 miles per hour also held by Capt. Broad.

Schoenhair's new record for the 1,000-kilometer course carrying a weight of 1,000 kilograms surpassed by 15.6 miles per hour the record of 137.198 held by Paillard and Champlan of France. The former record of 146.660 miles per hour for planes with 500 kilograms added weight over 1,000 kilometers was held by Fernand Lasne of France.

INSPECTORS TO RENEW PILOTS LICENSES

A NEW plan for issuing and renewing aircraft pilots' license applications has been placed into effect by the Aeronautics Branch of the Department of Commerce, according to a recent announcement of Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Under the new plan the original license will be issued by the Aeronautics Branch and the renewal which is required at the end of a six months' period will be handled by inspectors of the Department in the field. The Aeronautics Branch will renew the license once every five years.

There has been issued recently a new type of license which contains provision for six-month renewals during the period in which the license is in effect. Holders of pilots' licenses who desire renewal will be required to apply direct to the nearest district office or aeronautical inspector of the Department of Commerce. License holders were formerly required to make such application at Washington, D. C., by forwarding the license for renewal through the mails.

Detailed instructions for renewal of licenses will be mailed to all license holders thirty days prior to the expiration date of the licenses.

WOOD FOR AIRPLANE CONSTRUCTION IN U. S.

TWENTY-SIX different kinds of wood native to the United States are available for airplane construction, according to a recent announcement of the United States Forest Service. The Forest Service has been conducting experimental research at the forest products laboratory, Madison, Wis., and the results obtained showed that all of the woods for aviation purposes are available in forests in this country. The experiments were started in 1917 when spruce was the chief wood for airplane construction.

D. A. C. DISTRIBUTION UNITS REORGANIZED

A reorganization of distribution facilities of the Detroit Aircraft Corporation was effected recently, according to an announcement of officials of the concern. Included in the reorganization is the division according to territory of the sales activities of the various subsidiary companies, each unit functioning under the direct supervision of a sales executive.

B. D. Adams has been appointed director of the activities of the sales department of the Detroit corporation. John Nelson, general manager of the Ryan Aircraft Corporation, will supervise the sales of the Ryan company in the Central States. Ray W. Brown will be in charge of the sales of Parks Air College, Lockheed Aircraft Company, Eastman Flying Boat and Gliders, Inc., in the same territory. Carl B. Squier, general manager of the Lockheed division, will be in charge of Lockheed sales in the Western district, and Ted Schlueter will be Western district sales manager for the other subsidiary companies. C. R. Norton will supervise all sales in the New York district, and L. J. Robinson will represent the sales organization in the Southeast.

Further Curtiss-Wright Activities Consolidated

CONSOLIDATION of the subsidiary companies of the Curtiss-Wright Corporation was recently completed under the direction of Richard F. Hoyt, chairman of the board of directors of Curtiss-Wright group, according to a recent announcement of officials of the corporation. Included in the plan of reorganization of the Curtiss-Wright divisions was the appointment of Bruce G. Leighton, director of sales and service for the Wright Aeronautical Corporation, as supervisor of all engine sales, commercial and military, with the exception of water-cooled aircraft engines ordered by the Army Air Corps, which will be under the supervision of Frank G. Russell.

Publicity activities of the subsidiary companies which have been merged will be under the charge of Morris Markey, formerly publicity director of the Wright Aeronautical Corporation.

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MOORE SETS NEW LIGHT PLANE RECORD

A NEW world's speed record for light airplanes carrying pilot and passenger was established by Willfred G. Moore on February 12 at the Kansas City Municipal Airport. He flew an Inland Sport monoplane over a 100-kilometer course (62.137 miles) at an average speed of 126.95 miles per hour. The former record of 119.839 miles per hour was established in England by A. S. Butler. The flight was officially observed by a representative of the National Aeronautic Association and the Federation International Aeronautique.

The plane which Moore used in the flight is manufactured by the Inland Aviation Corporation of Kansas City, and is rated in Class C for record attempts, being a two-place plane with a weight empty of less than 881 pounds. William S. Goldfelty accompanied Moore on the flight as passenger.

Lieuts. White and McMullen Make Five-Day Flight to Buenos Aires

A FLIGHT from New York to Buenos Aires in five days over the route of Pan American Airways, Inc., was completed February 19 by Lieuts. Will W. White and Clement McMullen in a Lockheed Vega monoplane. The flight was undertaken for the purpose of demonstrating the practicability of fast air travel between the United States and Latin America, and included the first non-stop flight from continental United States to the Panama Canal. The plane was equipped with a two-way radio apparatus developed by Pan American Airways, which made possible the transmission of position reports every half hour to the ground stations along the West Coast of South America.

They completed the 6,870-mile flight from Newark, N. J., to Buenos Aires in a total elapsed time of five days and five hours. The actual flying time was fifty-two hours and fifteen minutes, an average of 131 miles per hour. The plane took off at Miami, Fla., stopping at Panama, Talara, Lima, Arica and Santiago, and followed the route of the Pan American company.

OUTLINES AVIATION MECHANICS' TRAINING

A PRELIMINARY outline of vocational training for airplane mechanics and aircraft engine mechanics has been prepared by the Federal Board for Vocational Education, according to a recent announcement of Frank Cushman, chief of trade and industrial education service. The outline stresses the need in aviation for properly trained mechanics, discusses the airplane mechanic's work, its scope, and contains an analysis of the trade, including wire work, fabric work, wood and metal work, rigging and inspection.

Included in the standards for the training of aircraft mechanics established by the Federal board are the following: The training must be given to selected individuals or groups who are able to profit by the instruction and expect to use in their work the knowledge and skill gained. Instructors must be competent; the training objective of each phase of the course must be clearly defined and thoroughly understood by the instructor. The subject matter to be taught must be such as directly functions in the work for which the pupil is being vocationally trained; necessary facilities for carrying on the training program must be provided; and the working conditions must be sufficiently favorable to make it possible to do a good job of training.

The outline was prepared with the cooperation of the Department of Commerce, the Navy Department, and the Naval Aircraft Factory at Philadelphia, Pa.

NEW LUXOR GOGGLE

A NEW and improved Luxor Goggle has been developed by E. B. Meyrowitz, Inc., of New York City. The goggle is designed to fit correctly any type of face and is equipped with apron cushions of broad, flat, feather-edged sponge rubber which shape themselves to any face. This prevents air seepage and creates a suction which holds the goggles securely in position without the necessity of a tight adjustment.

The goggle frame is constructed of duralumin which combines light weight with tensile strength and resists tarnishing and corrosion. Features of the older type Meyrowitz goggle are retained, such as the patented clutch type of micro-adjustable bridge to give horizontal alignment, and the ventilating system designed to prevent draughts, deflecting all air currents away from the eye. The Luxor No. 8 Goggle is provided either with white cylindrical ground and polished lenses according to Army Air Corps specifications, or with ground and polished deep-curve lenses according to Navy specifications.

ZIMMERLEY REACHES NEW HIGH ALTITUDE

AN UNOFFICIAL world's altitude record for light airplanes of approximately 27,000 feet was established on February 16 by Barney Zimmerley in a Barling NB-3 monoplane in a flight at Forest Park Field, St. Louis, Mo. The flight was made in conjunction with the International Aircraft Show held at St. Louis February 15-22. Zimmerley's record is over 5,100 feet in excess of the world's altitude record for light planes established in Germany in 1929.

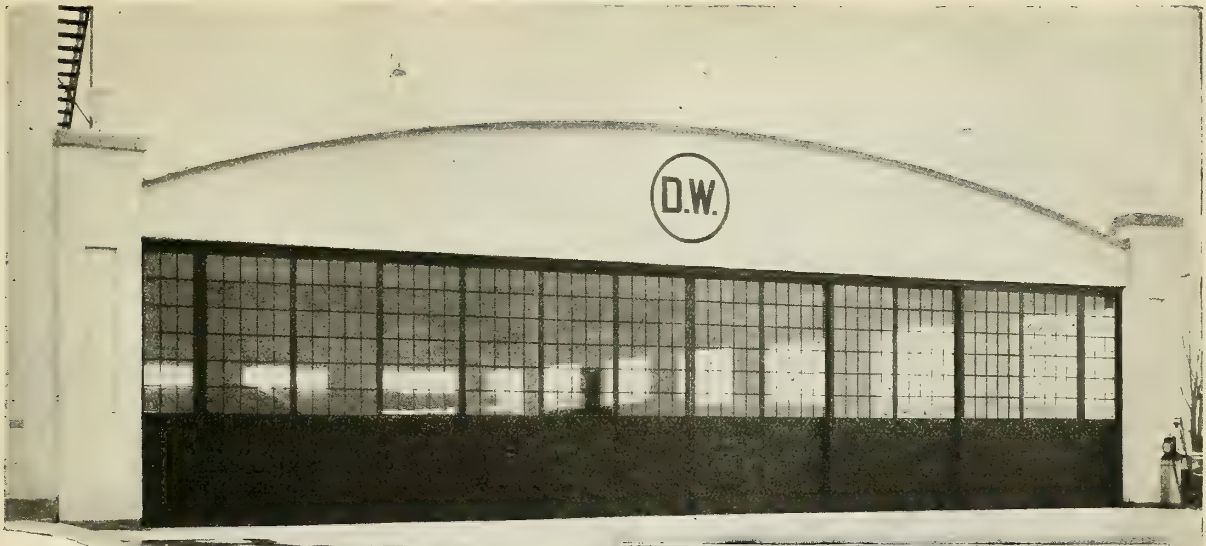
Zimmerley took off at about 2 p.m. and landed on the field two hours later. One of his barographs indicated that he had reached an altitude of 27,900 feet and the other 27,350 feet. His thermometers showed that he had passed through temperatures 32 degrees below zero. He carried two bottles of oxygen and a mask.

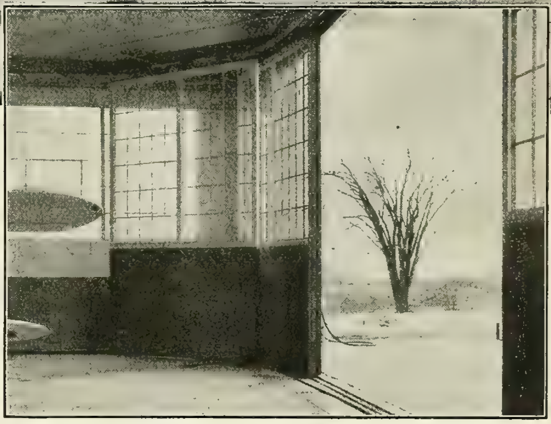
The flight was observed by Luke Christopher, secretary of the contest committee of the National Aeronautic Association who placed the barographs in the ship and examined them after the flight. The instruments were forwarded to the Bureau of Standards at Washington, D. C., for official calibration.

The Barling NB-3 plane which Zimmerley used on the flight was powered with a Lambert 90-horsepower five-cylinder aircraft engine, manufactured by the Lambert Aircraft Engine Corporation. The plane is manufactured by the Nicholas-Beazley Airplane Company, Inc., of Marshall, Mo., and is the same type of plane in which Zimmerley established a light airplane distance record of 1,650 miles last year in a non-stop flight from Texas to Canada.

(Wide World Photo)

Zimmerley and the Lambert-powered Barling in which he climbed to 27,000 feet





New D. W. Flying Service Hangar at LeRoy, N. Y., near Rochester. Steel Doors, Curved Track Type.

Standardized Airport Buildings and Hangars

Truscon Standardized Hangars have clear unobstructed floor space for handling airplanes. Steel doors open the full width of the hangar and operate easily. Steel windows provide ample daylighting. Insulated Steeldeck roofs complete the fireproofness of the building.

Machine shops may be located in a lean-to attached to the hangar or in a separate building. All the housing requirements of airports are amply met by Truscon Standardized Buildings.They are available in all types and sizes, with flat, pitched, monitor, lantern or sawtooth roofs. Truscon Engineers will give suggestions and quotations without obligation.

All Types of Hangar Doors

Truscon Steel Hangar Doors operate easily and are out of the way when open. They are rigidly built of quality materials and workmanship to withstand hard usage and give enduring service. Truscon Steel Hangar Doors are furnished in all sizes, in either Straight Slide or Curved Track Types and with or without glass panels for daylighting. Mechanical Operators are available for their automatic control.

Write for Steel Door Catalog and for information about other Truscon Steel Products for aeronautical buildings.

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1929 EXPORTS INDICATE 1930 MARKETS

By Wilbur R. Hanawalt

AMONG the issues of aeronautic development that will be settled during 1930, the establishment of the status of the various countries producing aircraft for sale in the world's aeronautical export market will be of major significance. During 1929 American aircraft manufacturers exported a total of $9,202,385, according to figures recently released by Leighton W. Rogers, Chief of the Aeronautics Trade Division, Department of Commerce. This volume of exports indicates that manufacturers in this country have devoted some attention to the broad field of the world market for aircraft, aircraft engines and parts; but developments that have already taken place in 1930 in the competitor countries indicate that the United States, if she is to keep a place of eminence in the world aircraft market, must meet severe and well organized sales competition. This competition will take place in the world's most important field for aeronautical exports—Latin America.

The aircraft producing nations of Europe are by their geographical nature and population dependent very largely upon export business. Being burdened with huge war debts and having subsidized their aviation industry since the war with large expenditures of money, they are being forced by economic pressure to make intense sales efforts in the export field. England has in the past endeavored to direct as much as was possible of the aviation business of her widespread colonies to her own manufacturers. On February 2 a London announcement stated that a $5,000,000 organization, with Sir Henry Segrave as technical advisor, had been formed to organize a campaign to capture world markets for British aircraft. Much of this effort will be directed upon South America. British papers have been urging the invasion of this market and plans have been made for the coördinated effort of English producers to introduce English aeronautical products into Latin America.

France and Portugal recently signed an agreement whereby aircraft of France would be the only foreign craft permitted to fly over or alight at Portuguese possessions. The territories chiefly concerned here are the Azores and Cape Verde Islands, both of which groups are of major significance as stopping places on transatlantic airlines. Although this action was apparently directed toward preventing Germany from approaching the Americas by air, it is also an indication of that country's effort to restrict competition in the aeronautic market of the Western Hemisphere.

In Germany recent developments have been such as to have an unquestionable influence on the world's aviation exports. The Reichstag has cut off governmental subsidy from all but four producers of airplanes and three engine manufacturers. The government has recommended that those companies which are not to be further subsidized either enter the international market so that their establishments will be self-supporting, or that they modify their plants for the production of other goods. While German production may be slightly reduced by this action, there will be a greater concentration upon export sales. Such an organization as the Rohrbach company, which is not included in the 1930 subsidy, will make every effort to sell its planes abroad. Too, the restricted subsidy given the recognized manufacturers, combined with the fact that the Deutsche Luft Hansa will purchase little equipment during the coming year, will stimulate these producers to participate in the world market.

A study of the possibilities for export trade immediately reveals that Latin America and China are the great fields for aeronautical sales. While China has a large area, great distances and a multitudinous population, the Chinese civilization and lack of education is a drawback to the most rapid development of aviation. In South America lie some of the greatest expanses on any continent, and the wealth and education of the people is such as to make Latin America the ground on which the competition for supremacy in the world's aeronautical market will be waged.

Our competitors have already become firmly entrenched in this territory. The Compagnie Generale Aeropostale, operating 4,795 miles of airlines with French planes and capital, has for years been showing South American countries the qualities of France's equipment and service. Scadta, with 2,544 miles of airlines using Fokker planes and some German capital and pilots, the Condor Syndicate, a subsidiary of the German Luft Hansa operating three routes, and the Lloyd Aereo Boliviano, which uses Junkers craft exclusively, have profitably and efficiently been demonstrating German products. Aircraft manufacturers of all the nations competing with the United States in this market have carried on extensive educational campaigns designed to direct the aviation education of the Spanish-speaking American nations in favor of their own products.

Against this advantage of priority held by their competitors, American manufacturers must make organized and well-directed sales efforts if they are to participate earnestly in

U. S. EXPORTS OF AIRPLANES, SEAPLANES AND AMPHIBIONS

Countries of Destination	1928 No.	1928 Value	1929 No.	1929 Value
Mexico	20	$190,133	85	$1,624,501
Canada	62	685,712	80	799,353
Chile	..	....	40	721,750
China	9	102,175	24	528,741
Argentina	5	55,052	25	375,693
Japan	3	63,000	17	291,767
Ecuador	..	....	5	187,237
Brazil	5	66,340	11	184,951
Peru	24	199,810	7	115,652
Panama	1	23,844	7	112,353
Hong Kong	..	....	11	104,600
Italy	2	84,950	5	99,219
Philippine Islands	2	34,500	5	88,622
United States	3	22,263	3	77,080
Colombia	1	19,250	1	60,000
Cuba	4	54,887	5	46,836
Spain	..	....	1	45,092
Salvador	..	....	3	27,840
Honduras	1	9,000	3	22,761
Netherlands		....	3	16,000
Guatemala	3	36,400	4	10,000
Norway	..	....	2	8,053
Germany	1	5,500	1	7,500
French Oceania	1	6,000	1	7,000
New Zealand	..	....	2	3,954
Australia	7	50,872	1	3,600
Dominican Republic	..	....	1	2,525
Uruguay	..	....	1	1,800
Belgium	1	4,183	..	....
Siam	4	38,400	..	....
Switzerland	2	4,532	..	....
Bermuda	1	2,850	..	....
	162	$1.759,653	354	$5.574.480

U. S. EXPORTS OF AIRCRAFT PARTS, EXCEPT TIRES

Countries of Destination	1928	1929
Canada	$540,215	$857,033
Soviet Russia in Europe	155,313	225,097
China	86,888	136,088
Peru	15,693	124,649
Mexico	21,162	114,027
Argentina	15,499	89,109
Germany	70,548	88,969
Japan	31,797	81,191
United Kingdom	58,166	58,511
Brazil	40,686	46,715
Cuba	24,184	41,710
Panama	22,705	38,428
Chile	17,443	38,068
Siam	1,101	36,501
Netherlands	20,483	36,183
Italy	6,546	29,504
Colombia	10,482	26,842
France	1,303	25,319
Poland and Danzig	4,575	24,340
Belgium	....	22,660
Philippine Islands	53,630	20,227
Union of South Africa	....	19,672
Australia	2,741	14,827
Sweden	4,455	8,163
Haiti	....	6,652
Hong Kong	2,182	5,500
Bermuda	....	4,575
Finland	....	4,050
Nicaragua	990	3,368
Denmark	...	2,769
Salvador	...	1,913
British West Indies	...	1,731
Honduras	2,253	1,607
Virgin Islands	....	1,603
Norway	1,925	1,500
New Zealand	....	1,444
Czechoslovakia	3,890	1.096
Ecuador	....	1,030
Switzerland	950	985
French Oceania	....	860
Spain	15,940	741
Surinam	....	655
Bolivia	....	567
Trinidad	....	396
French West Indies	....	300
Dominican Republic	....	231
Guatemala	1,517	50
British India	....	31
Venezuela	....	17
Java and Mandura	3.250	67
Other countries	1,732	4,637
	$1.240,244	$2,252.208

U. S. EXPORTS OF AIRCRAFT ENGINES

Countries of Destination	1928 No.	1928 Value	1929 No.	1929 Value
Germany	23	$132,510	49	$321,471
Panama	1	150	31	165,869
Poland and Danzig	1	3,574	35	121,015
Mexico	10	24,773	40	113,205
Canada	48	177,946	28	107,718
Japan	10	41,281	24	75,098
Netherlands	14	62,712	20	68,458
Philippine Islands	..	....	5	52,271
France	3	6,223	12	43,843
Peru	2	8,002	7	43,242
Argentina	7	23,315	14	43,083
China	5	38,900	9	39,000
Chile	..	....	6	30,577
Colombia	..	....	3	20,021
Soviet Russia in Europe	..	....	2	19,643
Switzerland	..	....	1	19,375
Brazil	8	6,200	4	17,428
United Kingdom	29	75,780	3	12,100
Belgium	1	10,000	1	12,000
New Zealand	..	....	2	8,266
Guatemala	..	....	4	7,150
Italy	4	8,338	3	5,660
Honduras	..	....	2	4,949
Cuba	3	250	1	4,827
Nicaragua	..	....	1	4,000
Surinam	..	....	1	4,000
Spain	1	3,111	1	3,960
Persia	..	....	3	2,100
Sweden	2	19,911	3	1,810
Australia	2	1,525	2	1,529
Salvador	..	....	1	913
Other countries	5	20,325	3	1,116
	179	$664,826	321	$1,375.697

the export trade which would give a free and healthy circulation to American aircraft production. A study of the accompanying tables of American aeronautical exports for 1929 shows the importance of sales effort in Latin America.

During 1929 the United States exported a total of $9,202,385 in aeronautic products, of which 354 landplanes, seaplanes and amphibions amounted to $5,574,480, 321 aircraft engines, totaled $1,375,697, and parts, excluding tires, amounted to $2,252,208. Mexico for the first time led the other markets as a recipient of American products with a total of $1,851,733, Canada being second with $1,764,104. China's position as the third largest market with a total of $813,929 (including exports trans-shipped through Hong Kong) indicates a startling growth of aviation in that country, as the 1928 total was but $227,963. Of the ten leading 1929 markets for United States aviation products, six were Spanish-speaking countries.

Mexico, Canada, Chile, China and Argentina were the five leading markets for complete aircraft during 1929, according to figures announced by the Aeronautics Trade Division. Three hundred and fifty-four aircraft valued at $5,574,480 were exported last year as compared with 162 valued at $1,759,653 during 1928. The average value of each airplane exported increased from $10,825 in 1928 to $15,747 in 1929. Exports of aircraft engines also showed a decided increase by the shipment of 321 valued at $1,375,697 as compared with the exportation of 179 worth $664,826 during the former year. Germany, Panama, Poland and Danzig, Mexico, Canada and Japan were the leading markets in the order of their importance. The average value of individual engines was $4,285. Aeronautic parts and accessories exported increased from $1,240,244 in 1928 to $2,252,208 last year, indicating that service facilities are being maintained for the planes sold abroad.

During 1929 Latin America received $4,493,517 worth of aeronautic products from the United States, or slightly less than half of our total exports. Twenty-three southern countries participated in these purchases. Leighton W. Rogers, Chief of the Aeronautic Trade Division, in an interview described some of the purposes to which these products were put.

MARKETS OF U. S. AERO-EXPORTS DURING 1929

Mexico	$1,851,733
Canada	1,764,104
China (and through Hong Kong)	813,929
Chile	790,395
Argentina	507,885
Japan	448,056
Germany	417,940
Panama	316,650
Peru	283,543
Brazil	249,094
Soviet Russia	244,740
Ecuador	188,267
Philippine Islands	161,120
Poland and Danzig	145,355
Italy	134,383
Netherlands	120,641
Colombia	106,863
Cuba	93,373
United Kingdom	70,611
France	69,162
Spain	49,793
Siam	36,501
Belgium	34,660
Salvador	30,666
Honduras	29,317
Switzerland	20,360
Australia	19,956
Union of South Africa	19,672
Guatemala	17,200
New Zealand	13,664
Other Countries	152,752
Total	$9,202,385

Mexico, which bought eighty-five airplanes and total purchases amounting to $1,851,733, used most of the planes for operations on divisions of international airlines in that country. Some were purchased by the federal government for training purposes, and a larger number were used to build up the military air service. The majority of the planes shipped to Chile were for military and training use by the government. American airlines, as well as those operated by the Chilean government, imported American equipment almost exclusively for commercial operations. Chile imported forty planes amounting to $721,750, six engines worth $30,577, and parts amounting to $38,068. Argentina was the fourth largest market for American exports with a total of $507,885 including twenty-five complete craft. Five single-engined commercial planes were put into use in the government subsidized flying clubs, of which there are approximately twenty. A few fast two-seaters were purchased for the Argentine navy and the remainder were used on airlines operating in the country. This volume is significant, as the French Aereopostale operates extensively in Argentina.

Panama, which made purchases amounting to $316,650, is using its aircraft imports on a trans-Isthmian commercial service. Peru bought seven aircraft and other products amounting to $283,543 last year. Brazil received six training planes for the use of a provincial government's aviation system. The country purchased in all eleven ships and a total of $249,094 in aviation products. Several large transports went to that country for surveying work prior to scheduled airline operations. The little nation of Ecuador, situated in the Andes Mountains, received two training planes and three transports for use on commercial lines. Its total aeronautic purchases from the United States for the year were $188,267.

Colombia, covered by a network of Scadta airlines using German capital and equipment, purchased a total of $106,863 for her aviation industry, including one plane flown from the United States by a Colombian pilot. Cuba's military air service uses American aircraft, engines and parts almost exclusively, and transport planes used in West Indian passenger and mail services were shipped to that country. During the last year Salvador purchased three light training planes for instructing native fliers and Honduras also purchased three planes, one for use on a feeder airline and the others for survey work and payroll transport by a large fruit company.

The growth in export business to the Latin American countries, as shown by these figures, indicates to a degree the reception given in this market to sales effort, however small, on the part of American airplane manufacturers; it does not, however, show the extent of aeronautical development still needed in those nations, nor does it indicate the extent to which these sales could be increased by adequate sales effort.

American manufacturers have never been seriously pressed to seek new markets for their products. Even during the recent slump these manufacturers, as a group, have not been forced to such action in the way that the European nations are now being forced by economic burdens. The American industry will, however, suffer in its future expansion if it does not meet with equal forces the European invasion of its South American market during 1930.

UNITED AIRCRAFT TO EXPORT $850,000 IN PRODUCTS TO PERU

EXPORT contracts involving a total of $850,000 in airplanes and aircraft engines were signed February 24 by United Aircraft Exports, Inc., of New York City with the Peruvian government, according to an announcement of the United Aircraft company. The contract calls for twenty-six aircraft and fifteen Pratt and Whitney engines.

The order includes twelve Wasp-powered Corsairs manufactured by the Chance Vought Corporation of Hartford, Conn.; three Hornet-powered Model 40-B mail and passenger ships produced by the Boeing Airplane Company of Seattle, Wash.; one Hamilton seaplane powered with a Hornet engine, manufactured by the Hamilton Metalplane Division of the Boeing company; and ten C-3R training planes powered with Wright Whirlwind engines of 220-horsepower, manufactured by the Stearman Aircraft Company of Wichita, Kan. These companies are subsidiaries of the United Aircraft and Transport Corporation.

The Vought Corsairs ordered by the Peruvian government will be used by the Peruvian Air Service as military observation planes. The Stearman planes will be used for training purposes at the Ancon Airport of the Peruvian government. The Hamilton seaplane will be placed into regular service on the Amazon River and will operate from a base in Iquitos; and the three Boeing planes will be operated on a route from Payta on the coast to the city of Chachapojas.

Included in the order are four Pratt and Whitney Hornet engines which will be used to replace Liberty engines in Douglas planes now in the service of the Peruvian government.

Two Ryan Broughams Shipped to Canton, China

TWO Wright-powered Ryan Broughams were recently shipped to the L. E. Gale Company of Canton, China, by the Ryan Division of the Detroit Aircraft Corporation, Robertson, Mo., according to an announcement of officials of the Ryan company. These planes made a total of eleven that have been shipped to China during the past two years by the Ryan company.

Mrs. Charles A. Lindbergh before starting flight in a Bowlus sailplane at Point Loma, Calif., with Col. Lindbergh looking on

LINDBERGHS AWARDED GLIDER LICENSES

COLONEL and Mrs. Charles A. Lindbergh recently qualified for first class glider pilots' licenses in flights made in the vicinity of San Diego, Calif. Colonel Lindbergh is the ninth person to qualify for the first class license in this country and Mrs. Lindbergh is the first woman in the United States to do so.

They used a Bowlus sailplane of the type in which W. H. Bowlus recently established an American glider record of six hours, nineteen minutes and three seconds at Point Loma, near San Diego. Colonel Lindbergh's flight was made from Point Loma, the shock cord method being used to launch the glider into the air. He remained aloft for thirty-one minutes, reached a maximum altitude of 1,500 feet and flew a distance of approximately eight miles, flying over Point Loma and out over the Pacific Ocean for a distance of half a mile. He landed when the wind had perceptibly died down.

Mrs. Lindbergh's flight was made several days later from Soledad Mountain, La Jolla, Calif., near San Diego; she remained in the air for nine minutes. Colonel Lindbergh qualified for the first class license in his first flight in a Bowlus sailplane, Mrs. Lindbergh receiving preliminary instruction in a glider towed behind an automobile under the supervision of Mr. Bowlus.

DEPT. OF COMMERCE DEVELOPS MEANS OF LICENSING GLIDERS

THE Aeronautics Branch of the Department of Commerce has developed adequate facilities for licensing gliders as to airworthiness and will encourage such licensing in the future, according to a recent announcement of Gilbert G. Budwig, director of air regulations, Aeronautics Branch, Department of Commerce. No formal requests have been received for glider licenses or glider approved type certificates, according to the announcement, although twenty states require Federal licenses of all aircraft and airmen, including gliders and glider pilots.

Applications have been made for identification marks for 110 gliders. These identification marks serve to identify the glider, it was pointed out in the announcement, and do not in any way testify as to the airworthiness of the craft. Gliders in other than the twenty states which require licenses for all aircraft do not have to be licensed unless engaging in interstate commerce. As gliding and soaring are more of a sport than a commercial venture, it was pointed out, it is not likely that the Aeronautics Branch will find any violations of the Air Commerce Act requiring the licensing of all aircraft engaging in interstate commerce.

However, gliders operating in the twenty states requiring all aircraft to be licensed violate the state law and are subject to penalty when no glider airworthiness certificates have been issued them. The states requiring Federal licenses are as follows:

Alaska, Arizona, California, Delaware, Idaho, Indiana, Iowa, Michigan, Mississippi, Missouri (except solo pleasure), Montana, New Mexico, North Dakota, Rhode Island, South Dakota, Texas, Vermont, Washington, Wisconsin, and Wyoming.

The general airworthiness requirements for powered planes are applicable to gliders with the exception of quantitative performance. In glider towing, with the exception of the use of man power, an approved device shall be used for cutting loose the towing cable, and the strength of the tow cable shall not exceed two-thirds of the maximum wing structure design load.

GERMAN GLIDING DURING 1929

E. P. A. HEINZE

THE Rhön-Rossitten Gesellschaft of Germany recently presented a report covering its work during 1929. This society trains pupils in gliding and sail-flying and issues glider pilot certificates to entrants passing examinations. It owns two flying centers, one in the Rhön hills in the southern half of Germany and the other on the dunes of the Baltic shore at Rossitten in East Prussia at the northeast end of the Reich. Numerous courses were held at each camp during 1929, and 269 pupils were trained at the Rhön location and 303 at Rossitten. The pupils consisted mostly of college students, teachers, officials of the Prussian and Bavarian air police force and some foreign pupils.

In the Rhön camp 139 pupils passed the A test, 121 the B and 30 the C test. In 1928 only 152 pupils were trained at Rhön so that the number in 1929 constituted a growth of over 77 per cent in training activities. The pupils at Rossitten during the previous year numbered 176 and the increase in their number during 1929 amounted to more than 72 per cent—this in spite of the fact that Rossitten is situated unfavorably in being separated from the rest of Germany by the Polish Corridor. This success is partly to be ascribed to the favorable prevailing winds in that part of the country. During the winter there is a constant east wind, permitting training to be taken up very early in the year, while at the Rhön field nothing can be done until the spring. At Rhön the weather conditions are also less constant and present more difficulties. The courses at the two centers include both theoretical and technical studies. This year the A-certificates will not be granted as the examination is so easily passed as to be no longer of value. The B-certificate is given for gliding performance and the C-certificate for sail-flying proper. Examinations for both of these have been made more difficult. In order to obtain the B-certificate the pupil has to execute five glides of at least one minute's duration each.

BOWLUS SETS SOARING RECORD OF 9:05:27

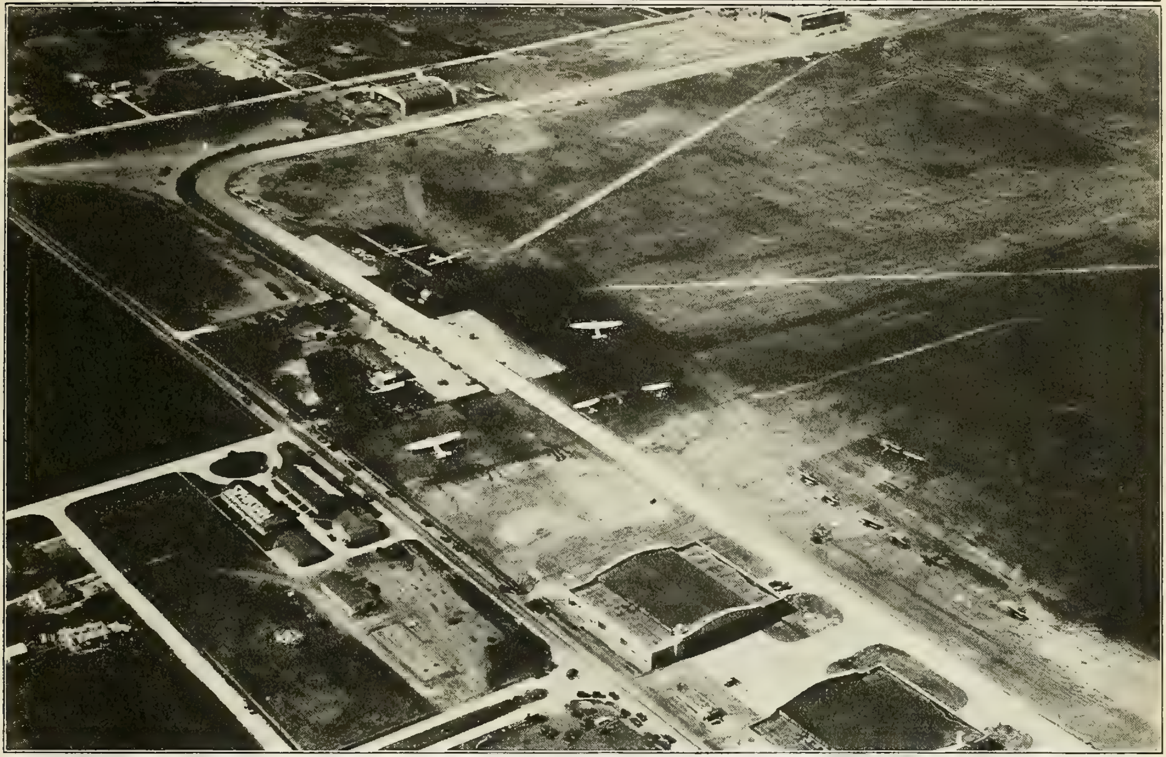
A NEW American glider record of nine hours, five minutes and twenty-seven seconds was established by William H. Bowlus in a flight at Point Loma, Calif., on February 14. He used a Bowlus sailplane of the type in which he established the previous American record of six hours, fourteen minutes and three seconds on January 13 in a flight at the same place. Previous to the flight on January 13, Bowlus had established several consecutive American records in his sailplanes.

The flight of February 24 was made in accordance with the official regulations of the F. A. I. He carried a sealed barograph on the flight which was forwarded to Washington, D. C., for official calibration. Bowlus took off at 5:35 p. m. on February 23, and a west wind of about twenty-mile per hour velocity aided him during the early hours of the flight. The wind suddenly shifted to the north and forced him to land at 2:40 a. m. He landed in a roadway seventy-five feet from the point of take-off.

NEW YORK GLIDER CARNIVAL APR. 26-27

A GLIDER carnival is scheduled to be held at the Old Belleclair Country Club, Bayside, L. I., April 26-27, according to a recent announcement of National Glider Association officials. The meet will be held under the auspices of the Aeronautical Chamber of Commerce of America, Inc.,

(Continued on next page)

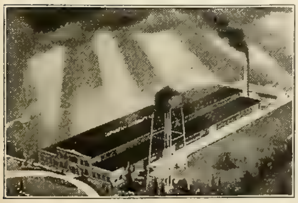


Tulsa's airport is one of the few municipal airports operated at a profit.

TULSA has the Nation's *Busiest* Airport!

Passengers preparing to board S. A. F. E. transport plane.

Buildings of the Spartan School of Aeronautics.



Spartan Aircraft Company factory.

Situated at the natural crossroads of East-West and North-South air travel in North America, the Tulsa Municipal Airport, in approximately 19 months of operation, has become *the nation's busiest* port of call for commercial aircraft. In that period 63,521 paid passengers arrived or departed from the Tulsa Airport by air. The most active week was that of October 5th, 1929, when paid passengers numbered 2,478 and Tulsa Airport business exceeded that at the Croydon, England, airdrome.

The most extensive transport operations from Tulsa are conducted by the Southwest Air Fast Express (the S. A. F E.) which has its headquarters at Tulsa This company is adding six more Fords to its present fleet of ten, which will give it rank as one of the two largest users of tri-motored Fords. Six arrivals and six departures roll up daily for this company a total of 3,900 miles.

Two divisions of Universal Air Lines—Braniff and Central—operate ten planes with five departures and five arrivals. And as this is written, Southern Air Transport announces a Dallas-Tulsa-Cleveland service using tri-motored Fokkers.

Scores of private plane owners appreciate the advantages of the Tulsa Municipal Airport, and military fleets bound east or west generally make Tulsa an overnight stop.

Tulsa is fast coming to be regarded as the nation's *primary* air center. Tulsa-made airplanes are already world-famous, and Tulsa is the only city in the nation having more than one aviation school carrying Department of Commerce approval as both ground and flying school.

TULSA

Hub of the Nation's Skyways

(Continued from preceding page)

American Motorless Aviation Corporation, New York Glider Club, Aero Club of Long Island, and the National Glider Association.

A tentative schedule of events which has been arranged includes experimental glider flights for N. G. A., licenses, demonstrations of secondary and primary gliders, airplane model contests, spot landing contest open to secondary and soaring type gliders, glider flying contest in primary and secondary gliders, and the arrival of Capt. Frank Hawks completing a transcontinental flight in a glider towed by an airplane.

The glider meet has been planned as part of the advance preparation for the First National Glider and Soaring Contest which will be held in the vicinity of New York City in September.

ALEXANDER BEGINS PRODUCTION AND SALE OF GLIDERS

THE manufacture and distribution of gliders has been started by the Alexander Aircraft Company of Colorado Springs, Colo., according to a recent announcement of officials of the Alexander company. Plans for the organization of glider clubs have been distributed to the 176 Eaglerock dealers in the United States and Canada.

The Alexander glider is the primary type with a wing spread of thirty-six feet. The glider has a welded steel fuselage of seamless chrome molybdenum steel tubing.

The Pikes Peak Glidaire, Inc., an organization sponsored by Colorado Springs business men, was formed following factory tests of the Alexander glider and purchased the first glider made by the company. The club supervised flights of the glider in which distances of over 1,000 feet were attained and a duration record of 46 seconds was made. Take-offs were made from a ledge fifty feet high.

A FLIGHT in a glider launched from the navy dirigible *Los Angeles* was successfully performed recently by Lieut. R. S. Barnaby of the Naval Air Service. The glider was released over the Naval Air Station, Lakehurst, N. J., at an altitude of 3,000 feet while the airship was cruising at about thirty-five knots, and reached the ground in thirteen minutes after circling the field in the descent. Lieut. Barnaby remained in the control car of the airship until the desired altitude was reached and then descended by means of a short ladder to the glider which was secured to a rack under the keel of the airship.

THE Duluth division of the Great Northern Aviation Corporation has announced through its manager, J. C. Skow, that its shops and the use of its mechanics is available to any clubs that will be organized in the city to build gliders. This offer is being made to stimulate interest in aviation in the city and especially in this form that can be enjoyed by a larger number of people because of the slight expense involved.

SCHEDULE OF COMING AERONAUTIC EVENTS

March 6-15. Second Annual Pittsburgh Aircraft Show, Pittsburgh, Pa.

March 12. Meeting of Aeronautic Division of American Society of Mechanical Engineers with Engineering Society of Western Pennsylvania, Pittsburgh, Pa.

March 17. Regional Airport Conference for New England, Providence, R. I.

March 22-29. Second Annual Buffalo Aircraft Show, Buffalo, N. Y.

March 26-April 1. First Cincinnati Aviation Show, Music Hall, Cincinnati, Ohio.

April 5-13. Third All-American Aircraft Show, Detroit Board of Commerce, Detroit, Mich.

April 18-26. Tri-State Aircraft Show, Convention Hall, Camden, N. J. Class C Show, Aeronautical Chamber of Commerce. (Postponed from March 22-29.)

April 26-27. New York Glider Carnival, Old Belleclair Country Club, Bayside, Long Island, N. Y.

May 3-10. New York Aircraft Show, Aeronautical Chamber of Commerce, Madison Square Garden, New York City, N. Y.

May 14-16. National Airport Conference, Airport Section, Aeronautical Chamber of Commerce, Statler Hotel, Buffalo, N. Y.

May 19-22. Fourth National Aeronautical meeting of American Society of Mechanical Engineers, Dayton, Ohio.

May 28-June 1. New England Air Tour, Dedication of Bowles Airport and Air Races sponsored by the Springfield Chapter of N. A. A., Springfield, Mass.

June 28-July 6. Pacific Coast Aeronautical Exhibition, sponsored by the Capt. Bill Erwin Post, American Legion, and the Aeronautical Chamber of Commerce, Oakland Municipal Airport, Oakland, Calif.

June 28. Annual British Royal Air Force Display, Hendon, England.

July 3-5. Western States Aeronautical Conference, Medford, Oregon.

July 6. Beginning of International Transportation Exposition, Poland.

September 1-6. Fifth International Air Congress, The Hague, Holland

November 27-December 14. Aeronautical Salon, Paris, France.

THE St. Louis Glider Club recently became affiliated with the National Glider Association, according to an announcement of officials of the club. Several new members were recently enrolled and the club has a membership of over fifty. Construction of a sailplane is planned by club members.

The St. Louis Glider Club holds monthly meetings at the downtown school of the Universal Flying School at St. Louis. Harry Kuchins, president of Kuchins Furniture Manufacturing Company of St. Louis, is director of the glider club. He recently leased a tract of land near Creve Coeur Lake for the development of a gliderport. This tract of land is surrounded by hills over one hundred feet in height and gliders may be flown at all times regardless of the direction of the wind.

THE Philadelphia Air Transport Company has ordered fifty secondary training gliders from Gliders, Inc., a division of the Detroit Aircraft Corporation. The Philadelphia company will use the gliders to train pilots and for sales and demonstration purposes.

STAND-TESTING AIRCRAFT ENGINES

By **Robert Insley**, *Vice President, Continental Aircraft Engine Company*

TWENTY-FIVE full-throttle continuous runs, each of which would carry an airplane from New York to San Francisco, have been completed by three Continental Model A-70 165-horsepower aviation engines running on endurance tests in the experimental laboratory of the Continental Aircraft Engine Company. These engines are being run, not merely as a demonstration, but to obtain an accurate test of the durability of materials and design of the various parts of the engine under conditions more severe than are encountered even in transcontinental service. The Continental engines operate at wide-open throttle for the entire run.

The test building is arranged so that the engines run under outdoor conditions at all times, the air temperature ranging from 0 to 50 degrees Fahrenheit during the tests. Snow and rain are drawn into the rooms by the suction of the propellers and blown over the engines at intervals. The observers are stationed in small rooms close to each engine, from which point the operation of the engine is watched and all data as to speed, fuel and oil consumption, air and oil temperatures and other factors of performance are recorded. Two shifts of observers are maintained to watch the tests and to take readings every fifteen minutes.

After a run is completed a careful inspection of each engine is made before removing it from the test stand. This is done to detect any sign of oil leakage or other unusual operating conditions. In the overhaul shop two mechanics, a licensed airplane engine mechanic who acts as key man and his helper, are assigned to the engine. The mechanic records on printed forms the condition of each part as it is removed. These records are complete and accurate, as the engine may include many experimental parts the endurance of which must be compared with other parts which were replaced for the test. The exact length of time each part has been run is obtainable by referring to the record of experimental parts which is maintained in a card file.

Special tools have been developed in the

(Continued on next page)

ANNOUNCEMENT

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And we announce at this time a reduction in price, based on quantity manufacture, coupled with a time payment plan which immediately makes the ownership of an Avian a highly practical investment for business or sport.

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When you fly or sell the Whittelsey Avian you have something to talk about. No other light plane has such a record of performance . . . or the equipment. Dealers and distributors are still being appointed. Write for our sales plan, and for full data and specifications of the plane itself. The Whittelsey Manufacturing Company, 220 Howard Avenue, Bridgeport, Conn.

WHITTELSEY

IN AMERICA
WHITTELSEY AVIAN
AVRO AVIAN
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AVIAN

THE OUTSTANDING SPORT AND TRAINING PLANE OF THE WORLD

(*Continued from preceding page*)

production and experimental departments which make the assembly and tearing down of the engines a comparatively simple matter. As the engine is taken apart and the parts washed and inspected by the key man, they are laid out on a specially constructed double decked stand, which has compartments for each group of engine parts, so arranged that inspection can be made easily and quickly. When the inspection is completed, the report is given to the engineer in charge of the laboratory who then checks the entire engine with especial reference to parts reported unsatisfactory by the key man. In this way the maximum amount of information is obtained from the endurance runs and an accurate index of the performance of the various component parts of the engine obtained.

Continuous full throttle operation imposes such a severe strain on the engines that the equivalent of many hundreds of hours of flight service is crowded into a single 25-hour wide-open run. Completion of these runs satisfactorily assures that the engine will give continuous trouble-free performance in the operator's airplane.

FLYING A DOYLE 02 TO MEXICO CITY

LIEUTENANT Knud von Clauson-Kaas, pilot in the Royal Danish Flying Corps Reserve, recently made a flight from Baltimore, Md., to Mexico City in a Doyle 02 light monoplane powered with a sixty-horsepower Le Blond engine. The Doyle, which weighs 780 pounds empty, was loaded with 710 pounds of disposable load for the trip. After landing at Valbuena Field and refueling, the small plane took off with a heavy load from the field situated 7,600 feet above sea level. The Doyle is the smallest ship which ever made the flight to the Mexican capital, to reach which an altitude of 12,000 feet is necessary in order to cross the mountains between Tampico and Mexico City.

The ship was a stock model, the only alterations made being the installation in the front cockpit of two additional gas tanks, with a fuel capacity of thirty-five gallons, which, together with the twenty-five gallons in the two wing tanks, gave a total gas capacity of sixty gallons. With a cruising consumption of approximately five gallons per hour, this was enough for between ten and eleven hours of flying. A battery-driven electrical fuel pump delivered the gas from the fuselage to the wing tank. Four gallons of oil were carried. The weight of the ship empty, 780 pounds, with gas and oil, extra tanks, battery, pump, tools and spare parts, baggage, and Irvin parachute and Lieut. Clauson-Kaas, all of which added 710 pounds, gave a total weight of 1,490 pounds.

The distance from Baltimore to Mexico City, as Lieut. Clauson-Kaas flew it is 2,200 miles. This distance was covered in thirty-five hours' flying time by the light ship, an average of sixty-three miles an hour, ground speed. The normal cruising speed of the Doyle 02 is eighty miles per hour with a high speed of one hundred miles per hour; but in the overloaded condition of the flight the air speed proved to be seventy-three miles per hour. The difference between this and the actual ground speed was due to almost constant headwinds met between Baltimore and Houston.

In describing the flight, Lieut. Clauson-Kaas said, "Although thus handicapped and delayed by fogs, which most of the days kept me on the ground, and contrary winds, so that after my start from Baltimore I didn't reach Brownsville, Texas, until six days later, I never had to pay even the slightest regard to heavy weather from a structural or flying point of view; my gallant little ship went through the worst of squalls in the manner of the sturdiest of bigger ships. Throughout the entire trip the game little engine, which had over 250 hours before the start, never missed a stroke. From Brownsville on I had good weather the rest of the trip."

Tampico was reached without incident. After taking off from that city the pilot climbed to 12,000 feet to pass over the mountains. Half way across the range that bars the Mexican capital from the coast, the fuel pump, installed to convey the fuel from the auxiliary tanks to the wing tanks, stopped working and rendered the gas in the fuselage tanks inaccessible. With the wing tanks running low, Lieut. Clauson-Kaas landed in a plowed field in the valley near Actopan. After filling the wing tanks with automobile gasoline, he took off the field, in which the furrows went against the take-off and which was located at an elevation of 7,800 feet. After an hour's flying he landed at Valbuena Field, Mexico.

Lieutenant Knud von Clauson-Kaas

The stop and return flight from Mexico City was described as follows by the Danish aviator: "I could write a book on my stay in Mexico City, and the astonishment of fliers who had said that such a low-powered plane could not reach the Mexican capital. My ship was taken to the military shops, which, in an efficient and quick manner overhauled both ship and motor, and put me in a position to view the impending return trip in a cheery mood.

"The start from Valbuena Field was about the most spectacular I have ever undertaken. This time I had to start from 7,600 feet, with my heavy extra tanks, and the almost full load of gas needed to reach Tampico. I used the full length of the field to take off and was soon on my way towards the coast. I picked my way along the bottom of every pass I could find, and utilized my experience as a glider pilot to pick out the places where upcurrents would lend me a helping hand."

After reaching Tampico, Lieut. Clauson-Kaas loaded additional equipment on the light craft and started the return trip to the United States. On the way up the desolate Mexican Gulf Coast, the specially installed electric fuel pump in the front cock-

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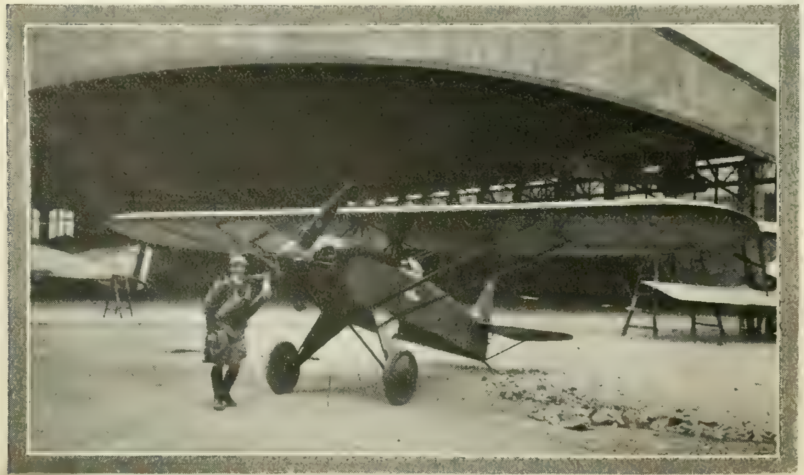

Lieut. Clauson-Kaas and his Doyle-02 after arriving at Valbuena Field, Mexico City

NATIONAL-SHELBY AIRCRAFT TUBING

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National Tube Company, long experienced in the manufacture of tubing for rigid requirements, fully appreciates the importance of safety in aircraft construction and the need of highly dependable products. Both designers and builders may rightfully expect that this long experience, plus the expert knowledge, skillful methods and selected raw materials used in manufacture, enable this Company to furnish a line of tubing peculiarly fitted to aircraft construction.

Every foot of NATIONAL-SHELBY Aircraft Tubing must pass through an intensive system of testing and inspection. Tests for both chemical and physical properties are made to conform to United States Army Specifications. NATIONAL-SHELBY Aircraft Tubing is carried in stock by distributors located at convenient points throughout the country. Descriptive literature sent upon request.

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Minnesota Steel Company
National Tube Company
The Lorain Steel Company
Tennessee Coal, Iron & R. R. Company
Universal Portland Cement Company

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City

(*Continued from preceding page*)

pit again failed—this time short-circuiting and setting its insulation and the fabric covering of the ship on fire. The pilot, who was flying low, turned, landed into the wind, and jumped clear shortly before the fuel tanks ignited.

After staying four days on the beach, Lieut. Clauson-Kaas was picked up by a Compania Mexicana de Aviacion plane and taken to Vera Cruz. He later returned to the East and is now making plans for a transatlantic flight this spring to his homeland, Denmark.

OPERATING COSTS OF BELLANCA PACEMAKER

BELLANCA AIRCRAFT CORPORATION, New Castle, Delaware, has prepared a set of figures showing cost of operation of its "Pacemaker," a six-place cabin monoplane with Wright Whirlwind Nine engine, and of the "Pacemaker Freighter," a development of this model in which two of the passenger seats are eliminated and a metal freight compartment of thirty-four cubic feet capacity is installed. The items of expense covered include gas and oil, maintenance, hangar rent, depreciation, complete insurance coverage, and salary for pilot and mechanic.

In the depreciation figures a life of 3,000 hours is allowed for the plane and 1,500 hours for the motor. In addition a maintenance cost of $2.00 per hour is allowed to keep both plane and motor in condition, which is considered ample allowance in view of the fact that a mechanic is employed and carried separately in the cost estimate. The gas and oil figures are based on the use of aviation gasoline at 30 cents per gallon and oil at 30 cents per quart.

The resultant figures covering the cost of operating the Pacemaker six-passenger cabin monoplane equipped with a Wright Whirlwind Nine engine are as follows:

Total Operating Cost

	Operating time per year	
	500 hours	1000 hours
Cost per hour	$42.95	$24.67
Cost per mile	.352	.202

Operating cost per paying passenger

	500 hours		1000 hours	
Payload	per hr.	per mi.	per hr.	per mi.
5 passengers	$ 8.59	$.07	$4.94	$.041
4 passengers	10.60	.0875	6.18	.0513
3 passengers	14.12	.117	8.24	.0685

The figures covering the Pacemaker Freighter show, by reason of its greater disposable load, an even lower operating cost than the standard Pacemaker.

The Pacemaker Freighter carries a disposable load in excess of its own weight empty, being the only ship manufactured under a Department of Commerce Approved Type Certificate which has such a rated loading. The payload of the freighter is 1,570 pounds, which may be made up of three paying passengers at 170 pounds each and 905 pounds of freight or may be entirely freight. The schedule below shows the cost of carrying each pound per 100 miles in the Bellanca Pacemaker Freighter 4-place and freight cabin monoplane with Wright Whirlwind Nine engine.

Operating cost per pound of freight per 100 miles

Payload carried	500 hrs.	1000 hrs.
1,570 lbs. (full load)	$.023	$.013
1,255 lbs. (80% load)	.028	.016
940 lbs. (60% load)	.038	.022
630 lbs. (40% load)	.056	.032

Both of these models considered have a large cruising radius. The Pacemaker passenger ship carries 112 gallons of gasoline which gives it a range of 7 hours, or 850 miles. The Freighter which has a fuel capacity of 85 gallons has a range of 5½ hours or 670 miles. It can be obtained with 112 gallon tanks if desired.

The cost figures given herein are, of course, subject to variation in accordance with individual conditions. Many of the items have purposely been taken at a higher figure than that normally found in actual operation. Hangar rent has been included at $50.00 per month and also allowance for a mechanic at a salary of $2,400 per year. If operating time per ship runs over 1,000 hours per year, as is often the case on busy airlines, the cost per hour and per mile becomes proportionately less.

TRADE LITERATURE

NEW PAMPHLETS AND BOOKS OF INTEREST TO THE AERONAUTIC INDUSTRY

Aircraft Yearbook for 1930 Published by Aeronautical Chamber of Commerce

"THE AIRCRAFT YEARBOOK FOR 1930" was made available to the public on February 15 by the Aeronautical Chamber of Commerce of America, Inc. The volume is the twelfth annual edition prepared by the association and contains over 500 pages and 200 illustrations and maps on up-to-date facts of aviation for quick reference. The publication is a handbook of technical and commercial developments, containing official records and other accomplishments in aviation during 1929.

S.A.T. Unit Publishes Airport Booklet

A BOOKLET on airport engineering and construction, with plates showing plans for building and fields, has been prepared by the Airports Engineering and Construction Corporation, a unit of the Southern Air Transport division of the Aviation Corporation. Printed for the use of prospective airport builders, the booklet contains plates illustrating typical problems and outlining essentials of the modern port.

Engineering Data Book No. 7 of Imperial Brass Manufacturing Company

THE Imperial Brass Manufacturing Company of Chicago, Ill., recently issued its engineering data book No. 7 on the Hi Duty Sky Service connections manufactured by the Imperial company for fuel and oil lines on aircraft engines. The booklet is of the loose leaf type and comprises a heavy rubberoid cover containing data sheets and other pages of text and illustrations. A technical description is given of the tests conducted over a period of two years by the Imperial company for the purpose of developing a vibration-proof fuel line fitting and obtaining the highest safety factor possible.

Booklet on S. S. White Flexible Shafts

A VOLUME entitled "Flexible Shaft Handbook" was recently published by the S. S. White Dental Manufacturing Company of New York City. The book has been prepared for the purpose of giving engineers and designers facts and figures concerning flexible shafts which heretofore have not been available in book form. The handbook contains 119 pages of text and illustrations bound with a heavy cover, and offers its data in a convenient and ready reference form.

Fifth Edition of Patent Work Prepared

THE fifth edition of "Patents—Law and Practice" on patent and trade-mark law has been prepared by Richards and Geier, patent and trade-mark attorneys, 274 Madison Avenue, New York City. The book will be sent free of charge upon application to Richards and Geier, or to AERO DIGEST.

Booklet Descriptive of South Bend Lathes

THE South Bend Lathe Works of South Bend, Ind., recently published Bulletin No. 77 descriptive of its products. This booklet contains twenty pages devoted to the description and illustration of the attachments used with New Model South Bend Lathes, many of which are of interest to airplane manufacturers and engineers.

"Air Travelog" Prepared for the Information of T. A. T. Passengers

A FOUR-PAGE booklet entitled "Air Travelog" has been prepared by Transcontinental Air Transport, Inc., for distribution to passengers traveling in planes on the company's lines. The pamphlet has been published to supply passengers with flight information while aloft and to enable them to know their positions en route.

The pamphlet briefly describes the principles of flying, the maneuvers of the plane in the air, the operation of the company, the selection of the crew, and gives non-technical data on the plane in which the passenger is traveling. Charts of the company's routes are given with information on the points of interest flown over.

Booklet on Manley Air Compressors

THE Manley Manufacturing Company of Bridgeport, Conn., recently prepared for distribution to the aviation industry Catalog No. 458. The booklet contains information which has been compiled to assist service station and airport operators in selecting proper air compressors for their needs, and describes the air compressors manufactured by the Manley company.

Booklet Covering the S-38, Plant and History of the Sikorsky Organization

A BOOKLET describing the Sikorsky S-38, 1930 Model, was published recently by the Sikorsky Aviation Corporation of Bridgeport, Conn. The booklet con-

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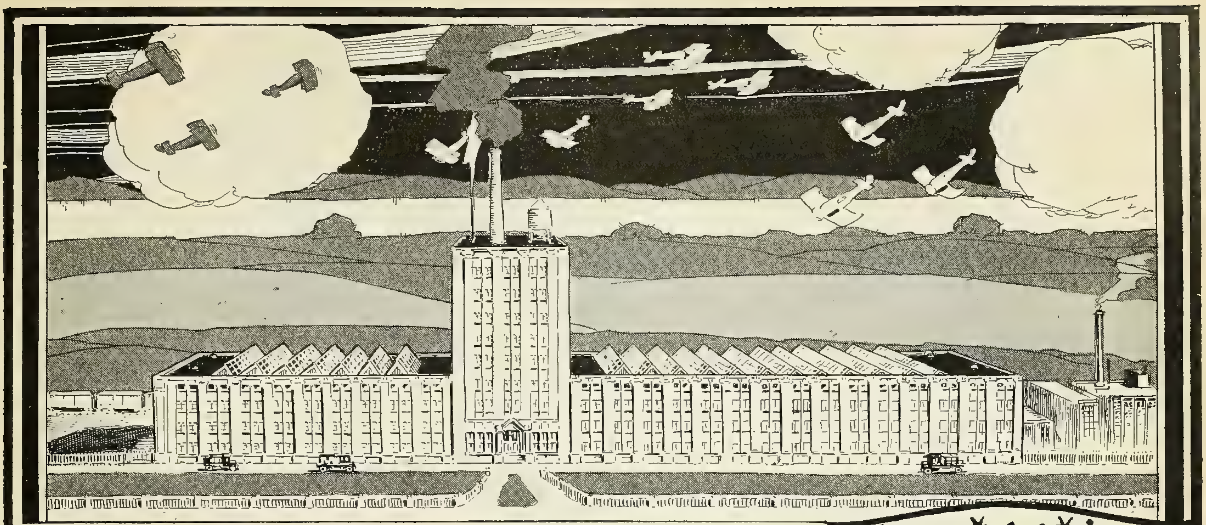

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(*Continued from preceding page*)

tains thirty-nine pages of text and illustrations. The art cover, which extends across the front and back covers, is a portrait of a Sikorsky plane flying through the clouds over a seascape, reproduced in color by means of autochromography, a process which preserves the character of the original technique of the artist.

The two center pages of the booklet are devoted to drawings and complete specifications of the S-38. Every left hand page is used to illustrate the text with photographs and drawings of the S-38, the Sikorsky factory at Bridgeport, and the first planes designed by Igor Sikorsky. The text matter is devoted to the uses and characteristics of this ship, its structural features, the activities of the Sikorsky company, and a brief sketch of the life of Mr. Sikorsky.

Brownback "Tiger" Described in Booklet

A CATALOG entitled "Brownback Tiger C400 Aviation Engines" was recently published by the Light Manufacturing and Foundry Company of Pottstown, Pa., manufacturers of Brownback engines. The booklet contains the specifications and general description of the "Tiger" engine and its individual parts, and is well illustrated with photographs and line drawings showing all details of the six-cylinder, ninety horsepower engine.

Booklet on Ball Bearings for Aircraft

A BOOKLET entitled, "Fafnir Ball Bearings for Aircraft" has been prepared by the Fafnir Bearing Company of New Britain, Conn., for distribution to the aviation industry. The booklet contains charts and data sheets explaining the advantages of ball bearings in airplane construction. Attention is devoted in the booklet to the use of ball bearings in airplane control mechanisms as a safety factor, and ways of using ball bearings for this purpose are explained in detail.

Richards-Wilcox Celebrate Fiftieth Anniversary

THE fiftieth anniversary of Richards-Wilcox Manufacturing Company was commemorated in the February issue of "Doorways," the company's house organ. The publication reviews the history of the organization and describes products manufactured by the company, including hardware and door hangers for equipping aircraft factories, hangars and other buildings utilized by the aviation industry.

Fairchild Pamphlet on Aerial Forest Surveys

A PAMPHLET on aerial forest surveys has been issued by Fairchild Aerial Surveys, Inc., in coöperation with James D. Lacey and Company, forestry engineers. The booklet describes the organization of the two companies and their methods of operation and coöperation. The Fairchild company operates airplanes used on the survey work, supervises aerial photography and maintains its own laboratories. The Lacey company directs a force of trained forestry engineers who work in conjunction with the Fairchild company.

The booklet describes the value of aerial forest surveys to timberland owners. The aerial maps which are made show timber distribution and surface conditions and, when combined with a ground inventory, give a reliable working knowledge as to kind, sizes and quantity of timber as well as location, acreage and operating conditions, according to the pamphlet.

Meteorology for Aviator and Layman

By RICHARD WHATTAM

RICHARD WHATHAM has prepared a text book to be used in the course in meteorology conducted at New York University, under the auspices of the Guggenheim Fund for the Promotion of Aeronautics, entitled "Meteorology for Aviator and Layman." The volume is intended to cover the basic principles of meteorology in addition to emphasizing the essentials that enable a pilot to fly with safety and economy, considered from the standpoint of computing hours aloft, gas consumption, courses and drift, the proper clothing to wear when preparing for a particular flight, and the anticipation of weather conditions. The book encompasses a study of the atmosphere, winds, clouds, storms, weather conditions, and meteorological instruments.

How to Fly

By LIEUT. BARRETT STUDLEY

"HOW TO FLY," by Lieut. Barrett Studley of the United States Navy is written on the premise that no book will teach the student to fly, but may teach him how to go about acquiring flight training. The volume is a development of the *Flight School Manual* written by Lieut. Studley and adopted for the use of the Naval Air Station at Pensacola.

The book explains in non-technical language the aerodynamic principles involved in flying, and the construction of airplanes. Considerable attention has been devoted to the methods of training flying students. Graphic descriptions of training flights are recounted, and advice is given the prospective flying student.

Airplane Mechanics' Rigging Handbook

By RUTHERFORD S. HARTZ and
ELZOR E. HALL

EXPERIENCE gained in Army Air Corps schools and civil aviation colleges has been incorporated the "Airplane Mechanics Rigging Handbook," by Rutherford S. Hartz and Elzor E. Hall. The volume comprises for the most part an exposition on present-day methods of airplane rigging. Questions listed after the various chapters stress the important points of procedure to be followed in airplane rigging and are designed to assist the reader in a study of the subject. In addition to rigging, the hand book presents data on fabric which includes gluing and splicing, metal parts, airplane wire, and dopes. The text is illustrated with drawings and sketches.

NEW YORK

LEON KELLEY has been elected secretary and copy chief of Fishler, Farnsworth & Co., New York advertising agency. Mr. Kelley's activities in aeronautics date back to 1917, with the 23rd Aero Squadron stationed at Hazelhurst Field, N. Y. He was the founder and managing editor of *Air Scout*, publication of the five Long Island flying fields during the War. As an agency executive, Mr. Kelley designed the first advertising campaign released by the Fokker Aircraft Corporation of America, and at present handles the advertising campaign of Bellanca Aircraft Corporation. Mr. Kelley is the author of "Efficiency, the Keynote to Progress," which was published in the November issue of AERO DIGEST.

AN INCREASE from twenty-one to twenty-seven in the membership of the board of governors of the Aeronautical Chamber of Commerce of America, Inc., was recommended recently by the members of the organization. The increase in membership on the board was recommended for the purpose of providing a more extensive representation of the aeronautical industry than is provided with the present membership.

HARRY C. POLE, formerly affiliated with the Ireland Aircraft Company, has been appointed chief inspector for the American Aeronautical Corporation of New York City. Mr. Pole's duties will include the supervision of inspection of all materials, both in the raw state and in the finished form.

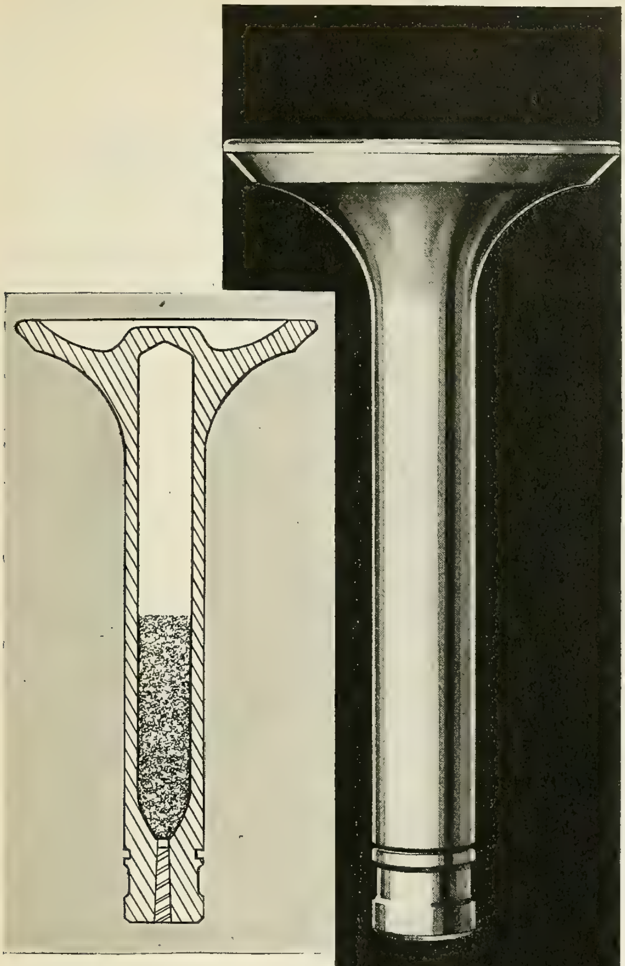
Aero Club of Long Island Formed for Sail-flying Activities

THE Aero Club of Long Island was formed recently for the purpose of engaging in glider flying, construction of sailplanes, and instruction in sail-flying. Club headquarters have been established at the Polytechnic Institute of Brooklyn, where members of the club meet weekly; a field for glider flying has been established at Montauk, L. I., through the courtesy of the Montauk Beach Development Corporation.

The field is located in hilly terrain suitable for glider flying and, according to officers of the club, a clubhouse will be constructed for the convenience and use of members. An Evans All-Steel primary glider has been purchased and will be used for preliminary training of club members.

The Aero Club of Long Island has obtained the privilege of using facilities for glider flying at the field of the Roosevelt Flying Service at Ammagansett, L. I., adjacent to the Montauk Beach field, and has been promised the use of the proposed airport and seaplane base at Napeague Beach, according to the club officials. The club provides facilities for assembling, building and rebuilding all types of gliders for the bene

(*Continued on next page*)



Illustrated is a Rich Salt-Cooled Valve for a Wright "Cyclone" engine. The diagram shows how the salt crystals, which pass into a liquid state when the motor is at operating temperatures, carry the heat away from the valve seat to the lower end of the valve stem whence it is dissipated through the valve guide bushings.

SOLE LICENSEES FOR THE MANUFACTURE OF SALT-COOLED VALVES

The following Aircraft Engine manufacturers use Rich Valves

Allison Engineering Co.
Chevrolet Aircraft Corp.
Chevrolet Aviation Motors Corp.
Crosley Radio Corp.
Curtiss Aeroplane & Motor Co., Inc.
Dayton Airplane Engine Co.
Fairchild Airplane Mfg. Corp.
Kimball Aircraft Corp.
Kirkham Aeroplane & Motors Corp.
Le Blond Aircraft Engine Corp.
Lycoming Mfg. Co.
Michigan Aero Engine Corp.
Packard Motor Car Co.
Szekeley Aircraft & Engine Co.
Warner Aircraft Corp.
Wright Aeronautical Corp.
U. S. Navy Department

RICH

R.S.P.

VALVES

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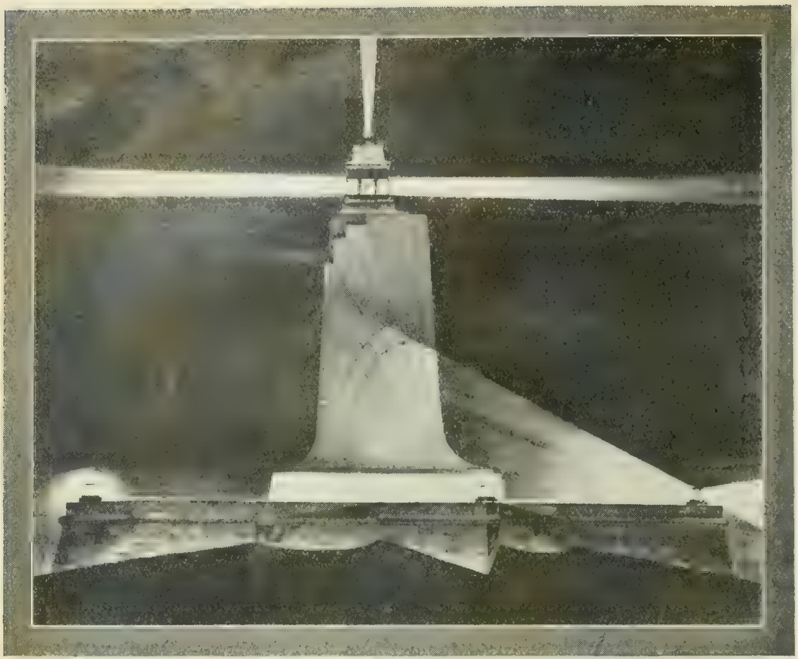
WILCOX-RICH CORPORATION, *Detroit*

World's Largest Manufacturers of Automotive Valves

Sold for Replacement Purposes Exclusively Through

McQUAY-NORRIS MFG. CO. - - ST. LOUIS *and*

KING QUALITY PRODUCTS CO. - - ST. LOUIS



Wide World Photo

Winning design for a Wright memorial at Kitty Hawk, N. C., submitted by Robert P. Rodgers and Alfred E. Poor of New York City

(New York News continued)

fit of members engaging in experimental work.

N. Y. U. Flying Club Activities Reported

A TOTAL of 343.5 hours was flown by members of the New York University Flying Club during the period from April 1 to December 31, 1929, according to a recent report of officials of the club. Of the total flying time, 244.25 hours were solo, 13.33 hours were spent by students taking flying instruction, and 83.92 by students flying as passengers. The New York University Flying Club has a membership of thirty-five, of which four are licensed pilots, two licensed mechanics and thirteen have student permits for flying.

Since October members of the club have had the use of an Alexander Eaglerock biplane loaned by Percy Warner, a member of the club, who won the plane last August in the college flying club essay contest sponsored by the Alexander Aircraft Corporation.

Theoretical ground school instruction is received by members of the club from the Daniel Guggenheim School of Aeronautics conducted at New York University, and the Air Corps unit of the R.O.T.C. Members put in forty-one hours on maintenance and minor repair work during a four weeks period in which the Eaglerock was available to them, working under the supervision of licensed mechanics in the membership of the club.

The New York University Flying Club won the first intercollegiate air derby held at Columbus, Ohio, in November in conjunction with the third semi-annual convention of the Intercollegiate Aeronautical Association of which the club is a member. Howard Ehman is president of the New York University Flying Club.

THE Navy Department has contracted with the Curtiss Aeroplane and Motor Company of Garden City, L. I., for nine fighting planes at a purchase price of $117,562.50. The planes will be known as the F8C-5 and are a military adaptation of the Curtiss type F8C-4, designed for commercial use. The F8C-5 is a two-place biplane powered with a Pratt & Whitney Wasp engine. The Navy Department purchased the planes for the use of the United States Marine Corps.

BARBER AND BALDWIN, INC., of New York City, was recently appointed underwriting agent for aviation insurance by the following companies: North British and Mercantile Insurance Company, Pennsylvania Fire Insurance Company, Commonwealth Insurance Company, Mercantile Insurance Company, Homeland Insurance Company, Northern Insurance Company, and London and Scottish Assurance Corporation. Arrangements have been completed by Barber and Baldwin for each of these companies to issue combination aviation policies with the Aero Indemnity Company, which specializes in aviation insurance.

ORGANIZATION of an aviation department has been effected by the Richfield Oil Corporation of New York City. The division will supervise research and sales of aviation fuels produced by the company. The Richfield Oil Company has been active in the development of aviation, having sponsored the installation of a $10,000,000 system of beacons installed from Vancouver, Canada, to the Mexican border, and the distribution of aviation maps of the California area. The formation of the aeronautical branch will facilitate the aviation program of the company.

The aviation division of the Richfield company will be headed by Fred L. Foster, formerly associated with George Brown of the department of chemical engineering, University of Michigan, and with Dr. C. C. Bridgeman of the Bureau of Standards, Washington, D. C. Mr. Foster is an airplane pilot, and has been engaged in the study of aviation fuels. He will be assisted by J. Babor, formerly of the Ethyl Gasoline Company.

CURTISS-WRIGHT FLYING SERVICE will concentrate its efforts during 1930 on the problems of distributing aviation products, according to a recent announcement of C. S. "Casey" Jones, president of the company. David Visel has been appointed sales manager of the company and will supervise the sales of airplanes, student instruction courses, aerial photography, airport equipment and general aeronautical accessories.

A TOTAL of 36,649 hours and forty-seven minutes were flown in 1929 by 1,361 active flying students in the regular courses of the Curtiss-Wright Flying Service schools enrolled for Department of Commerce pilots' licenses, according to a recent report of activities of the Curtiss-Wright schools during that period. There were no fatalities or accidents of major importance, according to the report. Forty schools are operated by Curtiss-Wright Flying Service.

A MEETING under the auspices of the Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautical Education was held at the Ambassador Hotel, New York City, February 26, in conjunction with the annual conference of the Department of Superintendence of the National Educational Association. The meeting was addressed by Dr. John W. Withers, Ronald H. Spaulding, Miss Amelia Earhart, and William B. MacCracken, Jr.

A DAILY air transport passenger and express service was scheduled to start March 1 between Providence, R. I., and New York City, operated by Eastern Air Express, Inc., according to a recent announcement of officials of the General Aero Corporation of America, of which the Eastern company is the operations division. The company will use Ford trimotor all-metal monoplanes. Providence Airport and Grand Central Air Terminal, New York City, will be used as terminals for the service.

THE C. T. Stork Corporation of New York City has been appointed distributor in eastern territory for the Great Lakes Aircraft Corporation of Cleveland, Ohio, makers of Great Lakes planes, and the American Aeronautical Corporation of New York, manufacturer of American Savoia-Marchetti flying boats and amphibions. The company is Eastern service agent for American Cirrus Engines, Inc., of Marysville, Mich., and maintains offices in New York City and a hangar and service shop at Roosevelt Field, L. I.

(Continued on next page)

THE LATEST IN AVIATION
HANDY · DEPENDABLE · LOW COST

Price $3.00
Over 230 pages, 90 illustrations and diagrams. Flexible binding. Size 5½ x 8".

AIR NAVIGATION AND METEOROLOGY

By CAPT. R. DUNCAN

Licensed Pilot in U. S., Canada, France, England

Here is a book that contains the exact information needed by a flyer to become an efficient air navigator. To study the book and make the widest possible use of it, requires only the ability to read, write and use common sense.

The entire subject is presented in a simple non-technical way without the use of mathematical problems. It explains the meaning of all technical words and terms and deals with maps and charts in a way that the reader cannot fail to understand. The principles of air navigation, weather forecasting, magnetism and magnetic poles, are thoroughly explained before taking up the practical side of flying and the use of flying instruments.

Other sections of the book cover the airplane compass and all instruments used in air navigation, such as the Air Speed Indicator—Altimeter—Course and Drift Indicator—and others.

Complete instructions are given for calculating magnetic variations, deviations, effect of wind on plane in flight (drift), and other problems of air navigation. Night flying, night flying equipment.

THE FAMOUS WILLCOX AVIATION BOOKS

Always the BOOK OF THE HOUR for Students, Instructors, Pilots, Mechanics, Owners, Shop Men, Draftsmen, Engineers, Builders, Designers and others.

Make your choice now of these famous books, by outstanding writers. Keep up-to-date on the world's most thrilling opportunity—Aviation. These great books endorsed by some of America's aeronautical leaders are recommended by them for practical study and authoritative information.

Written in plain everyday language, well illustrated, finely printed, durably bound—and downright important to your air success. Published for men who want the latest authentic information, without the need for deep and lengthy study. They give you what you want and what you need and give it to you quick. Sold and guaranteed to be the best books on the subject, and you are the judge, because you get your money back on your own "say-so" if they fail to please.

Step into your nearest bookstore and look over these great books today. Or mail the convenient coupon below, direct to the publisher for the books you want on three days trial.

AIRCRAFT ENGINE INSTRUCTOR

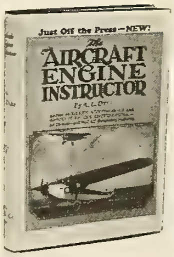
By A. L. DYKE

(Author of Dyke's Automobile and Gasoline Engine Encyclopedia) a book favorably known the world over.

NEW EDITION—THIRD PRINTING WITH MANY ADDITIONS INCLUDING MORE COLORED PLATES

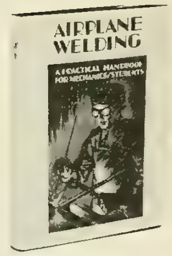
It covers construction, operation and maintenance of modern engines and miscellaneous accessories and equipment, such as carburetors, magnetos, starters, generators, aeronautic instruments, etc. Much space is devoted to the Wright "Whirlwind," the "Wasp," Curtiss, Packard, "Cyclone," "Hornet," "Chieftain," "Challenger," Warner, Velie, and other leading engines, including some well known foreign makes. A very complete discussion of the Curtiss OX-5 engine with engine trouble-shooting charts. Operation of super-chargers and rotary induction explained. Adjustment, care, inspection, straightening and balancing of propellers. Up-to-date specifications of airplanes and engines.

Many new subjects added, such as modern power plant installation showing complete fuel, lubrication and electrical systems and controls, including power-plant instruments, Wright "J-6", LeBlond, Cirrus, Anzani, Siemens, "Bristol", Jupiter, Junkers engines. Stromberg late type carburetors with colored illustrations explaining the accelerating pump action, etc. Series "N" Scintilla magneto with charts showing 61 parts. Principles of the Diesel engine, etc.



The Aircraft Engine Instructor is more than a book—it's a complete training on aircraft engine construction, operation, maintenance and repairing; an indispensable source of ready information for the student mechanic and pilot alike.

Contains 430 pages and over 500 illustrations, including folding colored inserts and master charts. Size 6½ x 9½ inches. It's the book of the hour, and is approved by leading manufacturers who helped in its preparation. **Price $5.00.**



Over 320 pages. 210 illustrations. Flexible binding. Size 5½ x 8".
Price $3.50

AIRCRAFT WELDING

By J. B. JOHNSON, M.E.

(Chief of Material Branch, Material Division of the Air Corps, Wright Field)

Between the covers of this timely book is packed every fact and every bit of information available today on the art of welding in aircraft design, construction and repair. It covers every method of welding—every type of weld—every weldable metal—in plain, every day language. It shows how welding enters into aircraft design—how ships are fabricated and built with all the different kinds of welds—how repairs are made, and best of all—it shows you how to make all the different kinds of welds and how not to make them too, so you can't go wrong.

The author has had a wide experience in actually doing and supervising the kind of work which he describes so well for you in his book. He has conducted experiments and made thousands of tests of various kinds. He has trained many men in the art of Aircraft Welding, and is considered everywhere a real authority on the subject.

There is nothing academic or with the school-room flavor in the material he gives you. He talks right from the shoulder in the language of the shops. His book is easy to read and easy to understand. You get every point he brings out, not only easily and quickly, but in a way so you will never forget it.

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Send me the books I have checked below for examination. I enclose no money but will deposit the price plus a very small postage charge with the postman on delivery. If I return the books in three days, you agree to refund my money.

.... Aircraft Engine Instructor $5.00
.... Air Navigation and Meteorology..............$3.00
.... Airplane Welding $3.50

NOTE: If remittance is sent with this coupon, we will pay postage charges. Same return privilege. (Remittance must accompany orders from Canada or foreign countries.)

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(New York News continued)

AIRCRAFT accessory sales of the New York division of Air Associates, Inc., totaled $250,000 in 1929, an increase of approximately 400 per cent as compared with accessory sales in 1928, according to a recent report of company officials. Net sales of airplanes of Air Associates, Inc., totaled $102,000 in 1929, a decrease of forty-three per cent as compared with net sales of airplanes in 1928.

G. S. IRELAND has been appointed executive vice president of the Ireland Aircraft, Inc., Garden City, Long Island, and will organize a sales organization for the distribution of flying boats and amphibions manufactured by the Ireland company. Mr. Ireland is the founder of the Ireland Aircraft, Inc., which he organized in 1924 He was appointed vice president in charge of sales of the Curtiss-Wright Flying Service in 1928, which position he recently resigned to rejoin the Ireland company.

GEORGE A. WIES, INC., of Roosevelt Field, Long Island, has been appointed distributor in the East for the Verville Aircraft Company of Detroit, Mich. George A. Wies, Inc., was organized in 1925 to distribute aircraft, and at present is distributor for the Stearman Aircraft Company of Wichita, Kan., Viking Flying Boat Company of New Haven, Conn., and the Aeromarine Klemm Corporation of New York City. The company maintains two hangars at Roosevelt Field.

LIEUT. PAUL L. FOSTER of the Air Corps Reserve has been appointed sales representative of the aviation department of the Richfield Oil Corporation of New York. He will supervise sales outside of New York and will be in charge of the flying equipment of the company. Lieut. Foster is a graduate of the Army Air Corps training schools at Brooks Field and Kelly Field, Texas.

ANNOUNCEMENT was made recently by the C. T. Stork Corporation of New York City of the permanent affiliation of Mrs. Keith Miller and Capt. W. Newton Lancaster, noted British fliers, as members of that organization. Mrs. Miller and Capt. Lancaster will act as demonstrators and sales promotion representatives for the Stork Corporation, which is distributor and Eastern representative for the Savoia-Marchetti and Great Lakes Trainer planes, American Cirrus engines and Irvin parachutes.

THE first of a series of lectures on aviation law was given at New York University on February 18. The lectures will be given on successive Tuesday evenings under the auspices of the School of Law, Washington Square, New York City, and will be under the direct supervision of Professor Alison Reppy. Lecturers who are among leading authorities in their particular divisions of aeronautical law will conduct the courses.

CARL T. BATTS has been appointed associate to David Visel, vice president of the Curtiss-Wright Flying Service, and will be stationed at New York City where he will be in charge of sales for the national organization. Mr. Batts was formerly manager of the St. Louis base of the Curtiss-Wright Flying Service.

CENTRAL NEW YORK

[M. MARVIN]

ANNOUNCEMENT was made recently by Robert C. Hayes, president of Hayes Aviation, Inc., owners of the Hayes Airport at Cicero, N. Y., of the establishment of a winter operation base in Fort Myers, Fla. Plans are already being laid by the company to further develop its southern branch next winter.

Work on the first unit of the new hangar at Hayes Airport, is nearly completed. The hangar will consist of three units, each sixty feet by ninety-seven feet. There will be a lean-to on the north and east sides. The north lean-to will be 180 feet long, and will extend the entire length of the three units, while the east lean-to will be ninety-seven feet long. The field offices may be built as a lean-to on the west side of the hangar. A steam heating plant will be installed when the three units are completed.

AT THE recent annual meeting of the Central New York Airways, Inc., of Norwich, N. Y., Warren E. Eaton was reelected president of the firm; Z. W. Craine, vice president; Melvin C. Eaton, treasurer, and Albert Lewis, secretary. The directors are M. C. Eaton, W. E. Eaton and Z. W. Craine.

EDWARD JOSLIN and Francis M. Johnson announce that the work is being rushed on their new J and J airport at Oswego, N. Y., in order that the field will be available for use by spring. The new J and J airport contains sixty-three acres. Mr. Joslin and Mr. Johnson are Eaglerock dealers in Oswego and vicinity,

PLANS are being discussed by aviation officers in Syracuse for the New York National Guard Convention, whereby the Municipal Airport at Amboy will be the night flying headquarters of the Twenty-seventh Division Air Service during its annual encampment at Pine Camp, July 27 to Aug. 10. National Guard pilots who have visited the airport at Amboy are in favor of making Syracuse the night flying headquarters. They point out that the Municipal Airport is adequately lighted and would lend itself admirably as a night flying base.

A PORTABLE fire engine with a capacity of forty gallons of Foamite has been designed by the American LaFrance and Foamite Corporation of Elmira, N. Y., for protecting fire hazards at airports and landing fields. The tank containing the Foamite solution is mounted on a carriage designed to withstand jolts. The wheels are mounted on ball bearings and fitted with eight-inch treads to facilitate the moving of the apparatus over soft, furrowed or frozen ground. Long pull handles in addition to pulling ropes are provided on the carriage.

FROM $5,000 to $10,000 will be expended for the development of Becker Field, Lockport, N. Y., by Lockport Flying Service, Inc., operators of the field. Included in the development of the field will be the erection of a hangar, marking of runways and rolling, grading and leveling the field. The contract for the construction of the hangar has been let and the work of developing the field has been started.

Lockport Flying Service recently placed an order with Becker Flying Service, Inc., distributors for Alexander Eaglerock planes, for two open-cockpit biplanes which will be used for student training at Becker Field. The company plans to purchase an Eaglerock Bullet, a four-place cabin monoplane which will be used to give advanced flying instruction.

At a recent meeting of the stockholders of Lockport Flying Service, Inc., the following officers were elected for 1930: Edward J. Becker, president; Frank L. Hoffman, vice president; Henry P. Becker, treasurer; Charles Hill, Jr., secretary; and Elmer E. Ace, chief pilot.

A COMPLETE new schedule in the Colonial air mail through Central New York went into effect recently. The schedule will officially introduce night flying through Syracuse.

The new schedule is as follows:

Westbound (read down) leave		Eastbound (read up) arrive
6:45 p. m.	Albany	6:25 a. m.
7:00 p. m.	Schenectady	6:15 a. m.
8:00 p. m.	Utica-Rome	5.25 a. m.
8:35 p. m.	Syracuse	4:50 a. m.
9:35 p. m.	Rochester	4:00 a. m.
10:15 p. m.*	Buffalo	**3:15 a. m.
10:30 p. m.	Buffalo	3:00 a. m.
1:00 a. m.*	Cleveland	**1:00 a. m.
*arrive		**leave

UNDER the terms of a contract with the General Electric Company which has been arranged by Airport Lighting, Inc., the General company will manufacture the Airport company's equipment and assist in the promotion of its sales. The Airport Lighting company will act as a national dealer for the General Electric Company and will distribute all General products applicable to the wiring and lighting of airports.

BUFFALO

[A. SHEPHERD]

CONSTRUCTION of a Canadian assembly plant at Bridgeburg, Ontario, by the Consolidated Aircraft Corporation of Buffalo, is to begin at an early date, according to a statement of Consolidated officials. A building to cost about $25,000 is planned to care for assembly, storage, shops and offices on the site on Gilmore Road. Steel superstructure, corrugated steel walls

(Continued on next page)

GLIDE - -

You Have a New Experience Awaiting You

Take your place on the prow of the Alexander Trainer, buckle the safety belt around you, signal to the boys on the ends of the shock cord that you are ready and with a rush you are off into the air. An up-current catches you. It lifts you. You sit, seemingly motionless, supported by nothing—except air. You ease forward on the stick to nose her down. You bank and turn at will. You level off as the ground approaches to come to a smooth landing. Gliding is like that.

And it is such fun that even veteran pilots hog the pilot's seat unless stern measures are adopted to make them wait their turn. Besides the fun, you can learn the principles of flying an airplane. It will cut your instruction costs, and make you forever a safer, surer airplane pilot.

To help you limit your expenditure to approximately $20 we have a club plan of glider ownership. We will tell you how to organize a glider club. Send for the interesting folder about gliding.

ALEXANDER AIRCRAFT CO.

403 Alexander Industries Bldg.
Colorado Springs, Colorado

Order Now for Early Delivery

$375.00

F.O.B. FACTORY

Demand for gliders makes it necessary to allot them in the order that $100 deposits are received. Assure early delivery of yours by sending your deposit now.

Alexander Aircraft Co.,
403 Alexander Industries Bldg.,
Colorado Springs, Colo.

Please send me your folder describing the Alexander glider and telling how to form a glider club.

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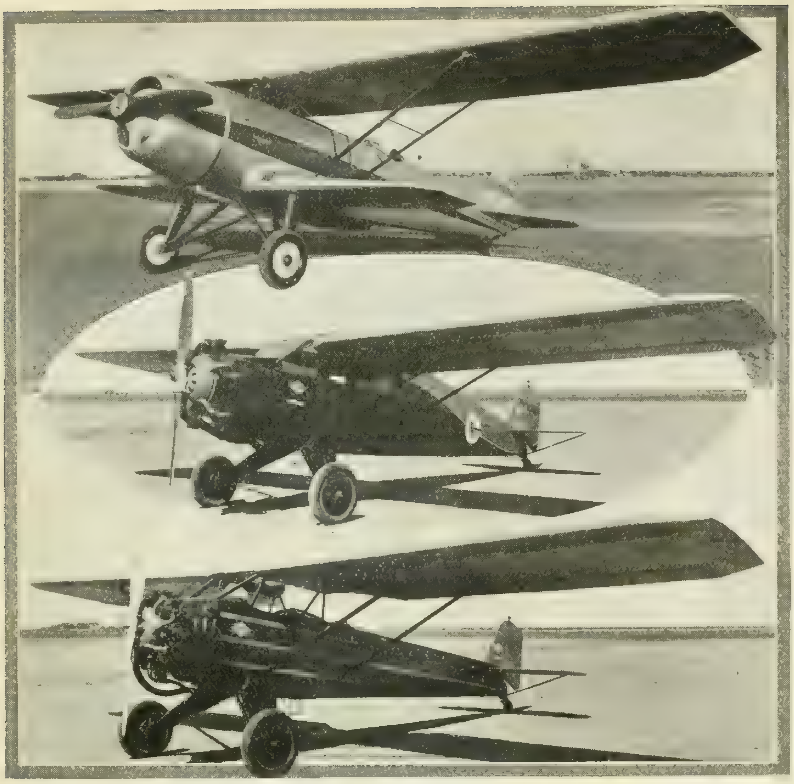
Street No..

City.. State...............



Planes produced by the General Airplanes Corporation of Buffalo, N. Y.: General mail plane, Aristocrat and Cadet

(New York News continued)

and roof, and cement floors will be incorporated in the structure.

General Airplanes Resumes Sales and Production

SEVEN Aristocrat planes were completed, sold and delivered by the General Airplanes Corporation of Buffalo, N. Y., during January, according to a recent report of officials of the company. Four of the planes were powered with Wright engines and three with Warner engines.

The General Airplanes Corporation recently completed negotiations with aviation training schools for the sale of a number of Cadet and Aristocrat planes. The planes will be used by the schools in the training of flying students who have completed instruction in open-cockpit ships and are qualified to begin cabin-plane flying instruction.

Consolidated Aircraft Corporation Reports Sales for 1929 and 1930

SALES of airplanes during 1929 by the Consolidated Aircraft Corporation of Buffalo, N. Y., increased approximately one hundred per cent over sales in 1928, according to a report recently issued by the company. During 1929, the Consolidated company sold 405 training and transport planes, which was over twice as many planes sold during the previous period of twelve months. The company has unfilled orders for 1930 totaling more than $2,500,000.

During 1929 the company sold 245 Fleet training planes, and orders from the United States Government and foreign governments for Consolidated Husky training planes totaled 155 in addition to orders for spare parts. Construction of the first Commodore flying boat was completed on October 1, 1929, and four of these planes have been delivered to the New York, Rio and Buenos Aires Line for use in air transport service.

The present production schedule of the Consolidated company includes the manufacture of ten additional Commodore flying boats, six Fleetsters, Government orders for Husky training planes, and an order totaling $1,000,000 for Thomas-Morse all-metal fighting planes. New planes which will be placed on the market by the Consolidated company during 1930 will include the Fleetster and the all-metal plane.

F. W. FULTON, sales manager of Fleet Aircraft, Inc., of Buffalo, N. Y., recently announced a new sales policy which has been adopted by the company. Dealers for Fleet Aircraft, Inc., will be required to take a minimum of three planes to obtain a dealer's discount of twenty-five per cent. All dealers will be required to post a $500 deposit on each plane, these deposits being returnable when deliveries are taken. Deposits will not be required after the third ship is delivered to the dealer.

Closed distributors' territories have been eliminated by the Fleet company and non-exclusive dealerships have been established. Competitive dealers will not be appointed but the company reserves the right to do so if a dealer in a given territory does not obtain satisfactory sales results. All of the Fleet company's contracts with distributors have expired and will be renewed under the terms of the new plan.

National Airport Conference at Buffalo

THE FIRST national airport conference, to be held in the Statler Hotel, Buffalo, on May 14, 15 and 16, will include a program of blind flying demonstrations, parachute jumping and similar demonstrations.

The plans were developed recently in a discussion between Nat Duffy, airport director at the Buffalo municipal field, and Homer C. Bennett, manager of the airport section of the Aeronautical Chamber of Commerce under whose auspices the conference will be held. Over five hundred airport executives and officials are expected to be in attendance.

Plans for Second Buffalo Aviation Show

THE Second Annual Buffalo Aviation Show will be held at the Broadway Auditorium, Buffalo, N. Y., March 22 to 29 inclusive. The Broadway Auditorium is located within a few minutes' walk of the Buffalo business district and the management of the second annual show has predicted that the attendance of 66,000 last year will be exceeded this year because of the more convenient location of the show.

Present plans include the exhibition of over thirty planes on the main floor of the auditorium and approximately the same number of aircraft engines and airplane accessories in booths located around the sides of the building. Other exhibitions include that of the Buffalo Public Library which will display a collection of books and other publications on aviation. A branch of the Post Office Department will be established in the auditorium during the show where air mail letters may be posted. Aviation schools in Buffalo and vicinity will occupy booths at the show and the Buffalo *Evening News* will exhibit a model of Admiral Byrd's camp in Little America, Antarctica. There will be model airplane contests held during the week in conjunction with the show and prizes will be awarded to the winners. A glider exhibition to be staged at the show will include craft constructed in Buffalo and others of German design and manufacture.

The show committee includes the following: Joseph H. Dotterweich, chairman, George Marlatt, vice chairman, Nathaniel Duffy, Capt. Lowell Smith, C. Roy Keys, Byram J. Waterman, Fred C. Arner, John O'Dea, C. P. Franchot, Thomas L. Holling, Robert Tifft, Ray Whitman, George Dotterweich, and E. D. O'Dea.

The story of aviation will be told in films during the second annual Buffalo Aviation show. The committee has obtained some of the best films in the country as an adjunct to the exhibition of many and varied types of aircraft to be displayed. A model plane exhibit, sponsored by the Buffalo *Evening News* will also be a feature of the show.

THE "Fleetster", eight-passenger monoplane constructed by the Consolidated Aircraft Corporation, is to undergo further

(Continued on next page)

Paragon

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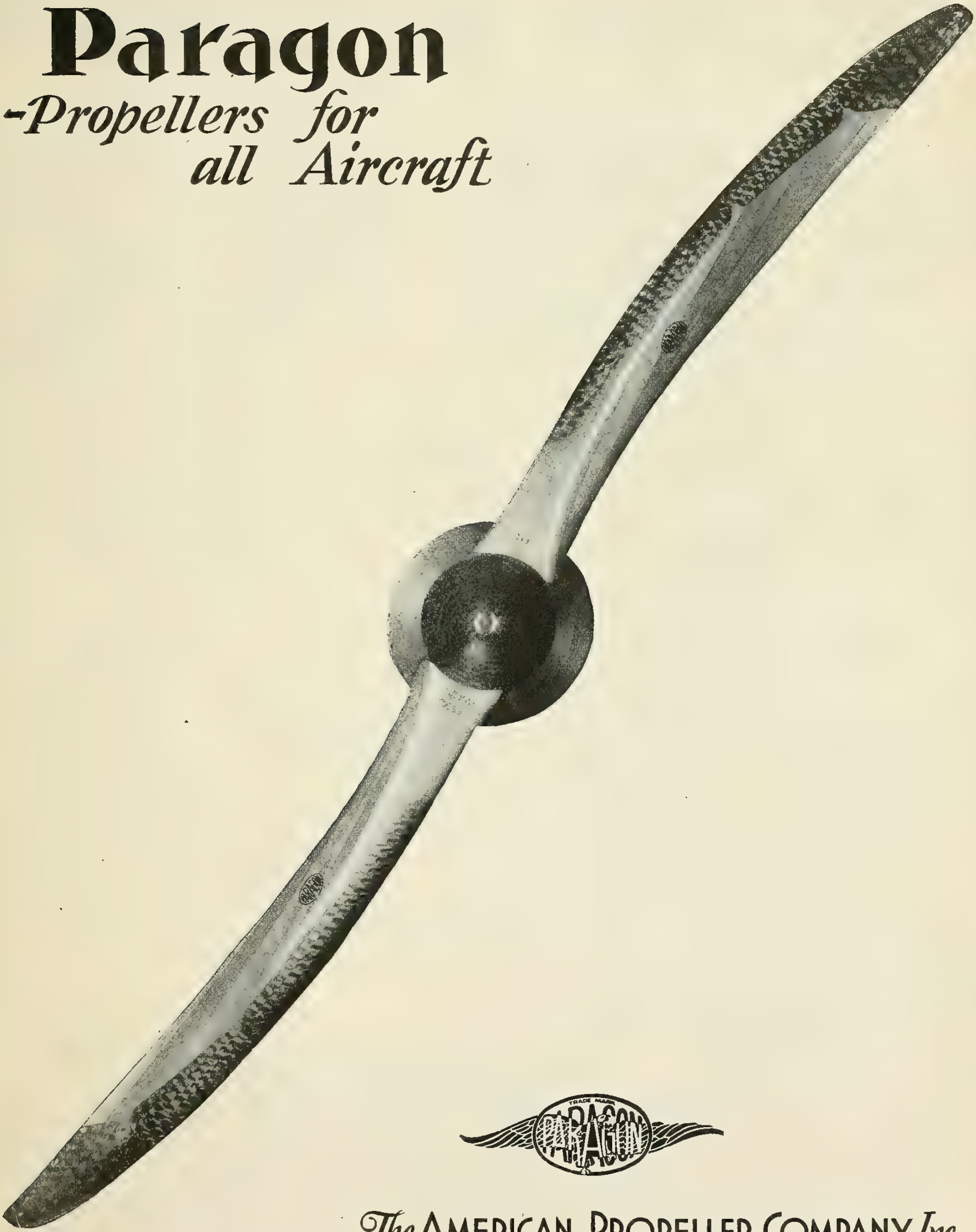

The AMERICAN PROPELLER COMPANY, Inc.
Division of Bendix Aviation Corp.,
BALTIMORE · MARYLAND

(*New York News continued*)

speed and altitude tests at the Buffalo Municipal Airport. The Consolidated Corporation recently returned this craft to the airport after replacing the Pratt and Whitney Hornet engine with a Wasp of 425 horsepower for testing purposes.

THE Consolidated Aircraft Corporation of Buffalo, N. Y., recently received an order for spare parts from the Navy Department involving a purchase price of $39,000, according to an announcement of officials of the company. The order included $10,150 worth of spare parts for NY-2 planes at the Naval Air Station, Hampton Roads, Va. The remainder of the parts included in the order will be sent to the Naval Air Station at Pensacola, Fla.

TEXAS

SOUTHERN AIR TRANSPORT, INC., will sponsor and encourage glider flying in Texas and the Southwest during the coming year, according to a recent announcement of Hugh L. Smith, general sales manager of the company. The company will sponsor flying in motorless planes in the belief that glider flying will provide excellent and inexpensive training in the control of heavier-than-air craft, and that it is a preliminary step in learning to fly powered planes safely and within a minimum period of time. Glider flying, in the opinion of officials of Southern Air Transport, provides a medium for initiating nonfliers into active participation in aviation, and is a solution of the problem of training private pilots who desire to purchase their own planes.

Eighty-four Graduate From Air Corps Advanced Flying School at Kelley Field in February

EIGHTY-FOUR students attending the Advanced Flying School at Kelly Field, San Antonio, Texas, were scheduled to graduate at the end of February, according to an announcement of the Chief of the Air Corps. Of this number, sixty-three made application for appointment as Second Lieutenants in the U. S. Army Air Corps.

All students graduated from the school will receive commissions as second lieutenants in the Air Corps Reserve, regardless of the approval of applications made for service in the Regular Army. Seventy-eight members of the class have filed application for extended active duty under their Reserve commission upon the completion of their flying course. This is the largest number of such applications made by a graduating class in the peace-time history of the Advanced Flying School.

ADDITION of three new stations, establishment of a maintenance and repair depot, and the increasing of power on the five stations already in operation are planned by the Southern Air Transport division of the Aviation Corporation as immediate improvements in its short-wave radio system. Atlanta, Ga., New Orleans, La., and Waco, Texas, are to be equipped with transmitting and receiving sets operating on 53 meters and using 250 watts of power. Dallas, Texas, is now operating on 500 watts and the El Paso Station will be increased to that power. San Antonio, Houston and Fort Worth will be increased to 250 watts. The stations are used to dispatch ships, send weather reports and general company communications.

Through an arrangement with the Coast Artillery station at Galveston, Southern Air Transport is offering to pilots flying in the territory covered by its systems complete weather reports from Galveston. The reports are broadcast from the government station over their short wave length radio at 9:30 each morning and received by the Southern Air Transport station at Houston, which in turn relays them to all points in the S.A.T. radio system. At these points it will be available to any one desiring the information.

LIEUT. HAROLD L. CLARK, who has been actively engaged in the preparation of plans for Randolph Field while stationed in Washington, D. C. has been assigned to the Air Corps Training Center at Duncan Field. On January 15th, Lieut. Clark arrived at the Texas field to begin co-ordinating activities of the construction quartermaster and the training center on the Randolph Field plans.

WITH the moving of the Primary Training School at March Field, Calif., to Randolph Field San Antonio will be the home of the complete Air Corps Training Center. According to General James E. Fechet, the concentration of training activities will be economical, and a more thorough course can be presented by having the entire school located at one post. Aside from the advantage for the primary school in being near the advanced school, the economic consideration in having all units together is a major one. The supply and overhaul activities are complicated, and a great saving can be made, according to General Fechet, by having the Air Corps training units near the repair depot, Duncan Field.

THE Spartan Aircraft Corp., of Tulsa, Okla., has opened a factory branch and sales distribution office at Love Field, Dallas. Capt. Dave W. Wiegal has been placed in charge of the company's Dallas activities. Office and hangar space is maintained in the temporary hangar used by Good and Foster Aero Service until that company's new steel hangar is completed. Spartan will then occupy space in the new structure. Three types of Spartan planes have been placed on display and will be increased as the demand warrants.

THE Secretary of War has authorized the establishment of an intermediate landing field at Midland, Texas. The personnel to be assigned to this field will consist of four enlisted men of the Army Air Corps, and two enlisted men of the Signal Corps of the Army.

The citizens of Midland have voted to dismantle a hangar located at Biggs Field, Fort Bliss, Texas, and re-erect it at Midland for the use of Army planes, and to construct buildings to house the personnel which will be stationed at the field. Meteorological personnel and equipment for the establishment of a weather service at Midland Field will be furnished by Chief Signal Officer, Maj. Gen. George S. Gibbs.

THE bond issue to be placed before the citizens of San Antonio during 1930 calls for sufficient allowances for aeronautics to provide for the construction of an administration building and additional hangars at the municipal airport, Winburn Field.

Graduates of Kelley Field Instructors' School

THE term of the instructors' school of the Army Air Corps which opened on January 15 at Kelley Field, San Antonio, Texas, was scheduled to be completed on March 1. A total of nineteen second lieutenants from various Air Corps stations were enrolled in the school. They are as follows: G. R. Acheson, James W. Andrew, F. A. Armstrong, Albert Boyd, M. M. Burnside, C. W. Davies, C. D. Fator, O. C. George, G. E. Henry, A. M. Kelley, Richard H. Lee, George H. MacNair, A. L. Moore, I. M. Palmer, E. P. Rose, E. A. Sanborn, W. P. Sloan, K. E. Tibbetts, and M. M. Towner.

Capt. J. K. Cannon of the Air Corps, in charge of the school, has the following officers of the Air Corps as assistants: Lieuts. J. S. Griffith, B. D. Knapp, C. W. Davies, H. C. Wisehart, and G. E. Henry.

SAN ANTONIO

[M. Cooper]

CONTRACTS for the construction of Government buildings at Randolph Field that will cost almost $3,000,000 have been awarded. John Marriott, San Antonio architect, received the largest contract and will draw plans for eighty-five company officers' quarters that are to cost $1,062,500. Other awards were made as follows: Ayres and Ayres, administration building, $237,000; Phelps and Dewees, bachelor quarters and mess building, $360,000; Emmet J. Jackson, cadet barracks, mess and recreation halls, $480,000; Henry T. Phelps, Air Corps shops, $210,000; George Willis, hospital building, $200,000; Adams and Adams, aviation school of medicine, $175,000; Harvey P. Smith, officers' mess building, $60,000; Herbert S. Green, eleven field officers' quarters, $159,500; Robert B. Kelly, post exchange building, $45,000.

On February 3rd bids were opened for the construction of two operations buildings and a fire station. The opening of bids for ten field officers' quarters, twenty-eight company officers' quarters and 130 non-commissioned men's quarters took place on February 10th. Forty-six non-commissioned men and two officers have taken residence on

(*Continued on next page*)

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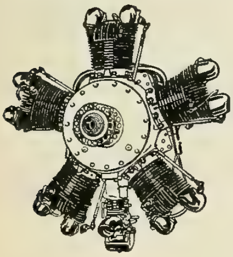

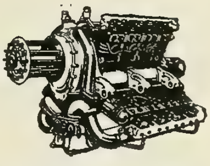

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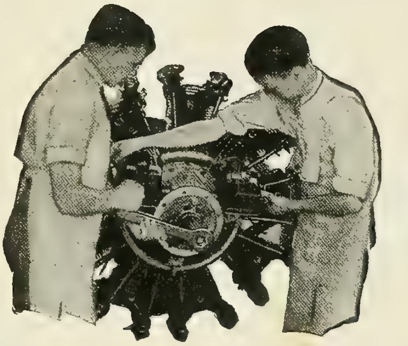

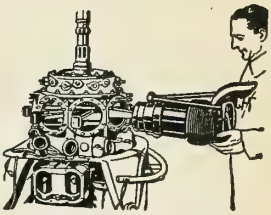

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(*Texas News continued*)

the field in the twelve tents for the purpose of serving in the post exchange and post headquarters and to guard and police the building area.

AIR passenger service between Houston and San Antonio was inaugurated January 24th by the Southern Air Transport, Inc. In addition to linking two important Texas cities, the new line forms a link of a through route to New Orleans eastward, and southward into Mexico, via Brownsville.

A NIGHT ground school of aviation has been opened by the Joe Ben Lievre Aircraft, Inc. The classes, which meet twice a week for a period of two hours, are conducted by Joe Ben Lievre, war pilot, who has been established at the Alamo Airport in San Antonio for several years. The ground school program will be built around a series of lectures which will cover every phase of the subject.

DURING the last eight years 864 aviators have been graduated from Kelly Field. Records show that only one fourth of the number of students entering the primary schools at March and Brooks Fields complete the course.

At present there are ninety-seven at Kelly Field, 147 taking preliminary training at Brooks and 148 at March Field, California. Of the ninety-seven cadets who were to graduate from Kelly Field the last of February, ten are to go to Panama and nineteen will be sent to the Hawaiian Department. Two hundred and thirty-nine candidates were ordered to Brooks Field and March Field for training as flying cadets beginning March 1, 1930. Forty-six of this number come from the enlisted ranks. Records further show that only one fatal accident in 45,430 hours of flying time at Brooks Field is the remarkable flying record established by the pilots at that field during 1929.

AUSTIN

[C. MORRIS]

IN ACCORDANCE with the plans of the Government to operate a lighted airway between Dallas and Brownsville, Texas, by way of Austin, Waco, and San Antonio, the airway from Dallas to San Antonio will be completed and lighted within the next four months. The problems relative to the lighting of the line and establishment of emergency landing fields on the route were recently investigated by a representative of the Department of Commerce.

Improvements to be made by the Department include the establishment of twenty-four beacon lights along the Dallas-San Antonio line, each throwing out a beam of 2,000,000 candlepower; the establishment of emergency landing fields at Belton, Georgetown, San Marcos, and Randolph Field, south of New Braunfels; and the installation of radio beacons at San Antonio and Waco, each beam of the beacons being 100 miles in length. The emergency landing fields will be lighted by the government with boundary lights, course, and obstruction markers for the guidance of fliers.

A STATE-WIDE campaign to encourage small Texas communities to designate landing fields and to mark their names for the convenience of aviators has been outlined by the aviation department of the Dallas Chamber of Commerce. Regional chambers of commerce are to be enlisted in the campaign and communities are to be shown that landing fields may be set aside by them and marked as such without prohibitive expense.

SOUTHWESTERN AERIAL SURVEYS, INC., of Austin, Texas, which was recently awarded a contract by the U. S. District Engineers at Vicksburg, Miss., for the photographing of 4,780 square miles of the Mississippi and Red River Valley, was erroneously reported to be a division of Southern Air Transport, a subsidiary of the Aviation Corporation, in the January, 1930, issue of AERO DIGEST. Southwestern Aerial Surveys, Inc., is a Texas corporation owned and operated by Austin business men. Officers of the organization are Robert Coltharp, president, Dick Normand, vice-president, Howard Taylor, secretary, and John D. Miller, treasurer. The aerial mapping and photographing concern leased two planes from Southern Air Transport for photographing the Mississippi and Red River territory.

OKLAHOMA

[C SANDLER]

LIEUT. APOLLO SOUCEK, holder of the world's altitude record for seaplanes, whose home is in Medford, Okla., was awarded the Spartan medal of the Oklahoma State Chamber of Commerce at a banquet held in Tulsa, February 25th. The Spartan medal, donated by Spartan Aircraft Company, Tulsa, Okla., is awarded each year to the Oklahoman contributing the most to aviation.

The Navy test pilot was unanimously chosen for the honor by a committee, headed by Capt. Ira C. Eaker, who was given the first award a year ago. Lieut. Soucek broke the landplane altitude record when he reached 39,140 feet in May, 1929. This record was in turn surpassed by a German pilot who went up 41,760 feet. In June, 1929, Lieut. Soucek established a seaplane altitude record of 38,560 feet which still stands.

The committee which selected Lieut. Soucek comprises Capt. Eaker, Fred Whittaker, Charles H. Hopkins, Ralph H. Berry, H. E. Martin and W. B. Estes.

A RECORD-BREAKING year for the Tulsa Municipal Airport, Tulsa, Okla., during 1930 is predicted by C. W. Short, manager of the field. On January 1, 1930, the Tulsa port completed its eighteenth month of operation. Figures compiled by Mr. Short to that date revealed that during the year and a half a total of 61,500 passengers have flown to and from the port. In the same time, 16,400 planes have operated from the field.

The last year, too, saw an extensive building program for the port carried to completion, including the erection of Universal, S.A.F.E. and Spartan hangars. By the end of 1930, a permanent administration building will be erected, according to Mr. Short.

TWENTY-SIX officers and students of the United States Army Air Corps from Kelly Field, San Antonio, Texas, were guests of the Tulsa Chamber of Commerce from February 6th to 8th when they flew into Tulsa on their last training flight before graduation. The group, which was under the charge of Major C. L. Tinker, assistant commandant of the field, was the attack section of Kelly Field's graduating class that won its wings on February 28th.

SPARTAN AIRCRAFT COMPANY recently announced production of the new Spartan C-3-166 powered with the Comet 7-cylinder 165 horsepower engine, which has been awarded Approved Type Certificate No. 190. This is the third biplane of the Spartan line to be offered, the other being the C-3-225, powered with the Wright Whirlwind Seven, and the C-3-165, powered with the Wright Whirlwind Five. It is a three-place open-cockpit ship with a high speed of 115 miles per hour.

OFFICIALS of the Spartan School of Aeronautics at Tulsa, Okla, recently announced that an advanced transport course which will offer trimotor transport pilot training has been added to the school's curriculum. This advanced transport course is being offered in coöperation with the Southwest Air Fast Express airlines, and instruction will be given students by R. W. Cantwell, chief pilot, and Lawrence Fritz, general manager of S.A.F.E.

The course includes instruction in Ford trimotor airplanes, with special emphasis on the transition from single-engine to multi-engined ships, landings, take-offs, stalls and recoveries, and tight vertical spirals. Construction and maintenance of trimotor airplanes and modern airline operation will also be covered.

[C. M. COLE]

DEDICATION of the new Curtiss flying field with its $80,000 hangar northwest nounced for March 15 to 22, according to B. S. Graham, Curtiss Flying service manager. Air races to and from Oklahoma City and a two-day exhibition are among the events planned. The field includes 160 acres and is being finished along the most modern ideas of construction.

AN expansion program for 1930 for the Ranger Aircraft Corporation, newly acquired operating name of Coffman Monoplanes, Inc., at Oklahoma City, involves increasing production and the addition a new three-place cabin Warnar Scarab powered monoplane to its line of products. The company was reorganized with D. J. Marshall, president; Virgil Browne, vice-president, and

(*Continued on next page*)

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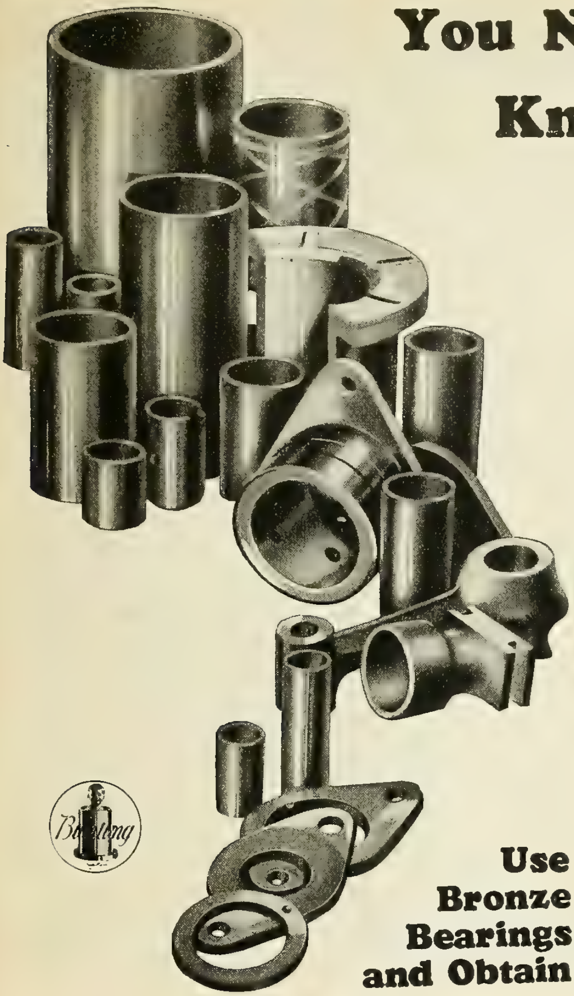

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(Oklahoma News continued)

F. M. Durland, secretary-treasurer. The directing board includes W. E. Hightower, C. A. Vose, Harrison Smith, H. C. Martin, and L. T. Hill.

RADIO equipment is to be installed at the Oklahoma City Municipal Airport to permit communication between port attendants and pilots in the air, officials of the field recently announced. The airport was designated for this equipment nearly a year ago, but installation was delayed pending final arrangements and location of the port. The city will be one of 35 in the country so equipped. One of the main purposes of the installation is to assist pilots when landing in bad weather.

THE Southwest Air Fast Express airline fleet will be expanded by a recent purchase of six new fourteen-passenger Ford trimotor planes, according to Erle P. Halliburton, president. This gives a total value to planes owned by the company, of $850,000, and makes the Tulsa line the largest user of the Ford planes in the world.

THE new hangar of Southwest Air Fast Express at the Tulsa, Okla., airport has been completed at a total cost of $150,000. It is 100 by 160 feet in size with a 160-foot door span and contains repair shops, hangar space for the ten trimotor Ford planes owned by the company, in addition to offices. Repair shops are housed in a 42-foot lean-to on one side and offices in a similar structure on the other side. An overhead crane with a weight capacity of four tons travels the width of the hangar, and will transport motors to and from the planes and lift entire planes to facilitate making repairs on landing gears. W. M. Arnold is in charge of the shops. At the front of the building are large passenger waiting rooms adjoining the executive offices, and at the rear of the section are rooms for pilots.

T. F. BROADHEAD has been elected president of the recently organized glider club formed at Canton, Okla. Willard Buck is secretary-treasurer and N. O. Kimball is construction engineer for the organization.

A COMMITTEE on air activities has been created by the Holdenville, Okla., chamber of commerce with Charles H. Anglin, chairman. Other members include Paul Heady, Ray Brame, A. Dalton and G. R. Stirman.

KANSAS

A FEDERAL weather bureau, including a radio beacon station, will be installed at the municipal airport, Wichita, Kan., by July 1, according to a recent statement made by Alfred MacDonald, Director of Parks for Wichita. The station will make reports of flying conditions throughout the country available at the municipal airport, and will broadcast these signals to planes flying in the Middlewest and Southwest, in addition maintaining a directive radio beacon. Space for the bureau will be provided in the new adminisistration building, which will be constructed at the airport this spring. Present plans include the construction of a small building housing the transmitting equipment of the radio beacon at a point about 800 feet south of the airways communication station, and about three-fourths of a mile from the municipal airport, on land owned by the county. Four masts each fifty-five feet in height will be installed near the transmission building and will be about 300 feet apart, and a signal mast sixty feet high will be installed. The personnel in charge of the present airways station will operate the radio beacon apparatus.

APPROVED Type Certificate No. 292 was recently issued for the Stearman Junior Speedmail powered with a Pratt & Whitney Wasp engine of 425 horsepower, following tests conducted by the Aeronautics Branch of the Department of Commerce. The ship is manufactured by the Stearman Aircraft Company of Wichita, Kan. Flight tests of the ship, powered with a Pratt & Whitney Wasp Junior engine of 300 horsepower, will be conducted by the Department of Commerce for an Approved Type Certificate covering the ship powered with that engine.

CONSTRUCTION of a glider with steel fuselage will be started by members of the glider club of Hutchinson, Kansas, according to present plans. The club was recently organized by Eldon Dale. The club owns at present two gliders which have been flown by members by towing behind an automobile.

THE Shell Aviation Corporation has purchased a Travel Air S Mystery Ship, a low-wing, single-place monoplane, from the Travel Air Company of Wichita, Kan. The plane will be used by Lieut. James H. Doolittle, who recently resigned from the Army Air Corps to accept a position as head of the aviation department of the Shell Petroleum Corporation. The ship is powered with a Wright Whirlwind Nine engine, and has a high speed of 240 miles per hour and a cruising speed of 180 miles per hour.

Eugene de Penaloza, Ass't Sales Manager of Shell Petroleum Aviation Department

AN ADMINISTRATION building will be constructed at the Wichita Municipal Airport, Wichita, Kans., at an estimated cost of $200,000, according to a recent announcement of the city commision, which recently granted the board of park commissioners permission to advertise for bids for the construction of the building. The money for the construction of the building will come from the regular tax levies for park purposes, according to the announcement.

MISSOURI

A 20,000-mile inspection flight over the route of Pan American-Grace Airways has been started by Eugene de Penaloza, assistant sales manager of the aviation department of the Shell Petroleum Corporation of St. Louis, Mo. Mr. de Penaloza will supervise a survey of the Pan American company's landing fields for the purpose of expanding facilities for supplying airplanes with fuels and oils.

FRANK G. BUFFUM MANUFACTURING COMPANY of Louisiana, Mo., makers of aircraft supplies and toolsmiths, have organized an aeronautical division which will supervise the manufacture and sales of aeronautical hardware, aircraft engine parts and aircraft accessories produced by the company. Eugene L. Smith, formerly general purchasing agent for Universal Aviation Corporation, has been appointed supervisor of the new division of the Buffum company.

KANSAS CITY

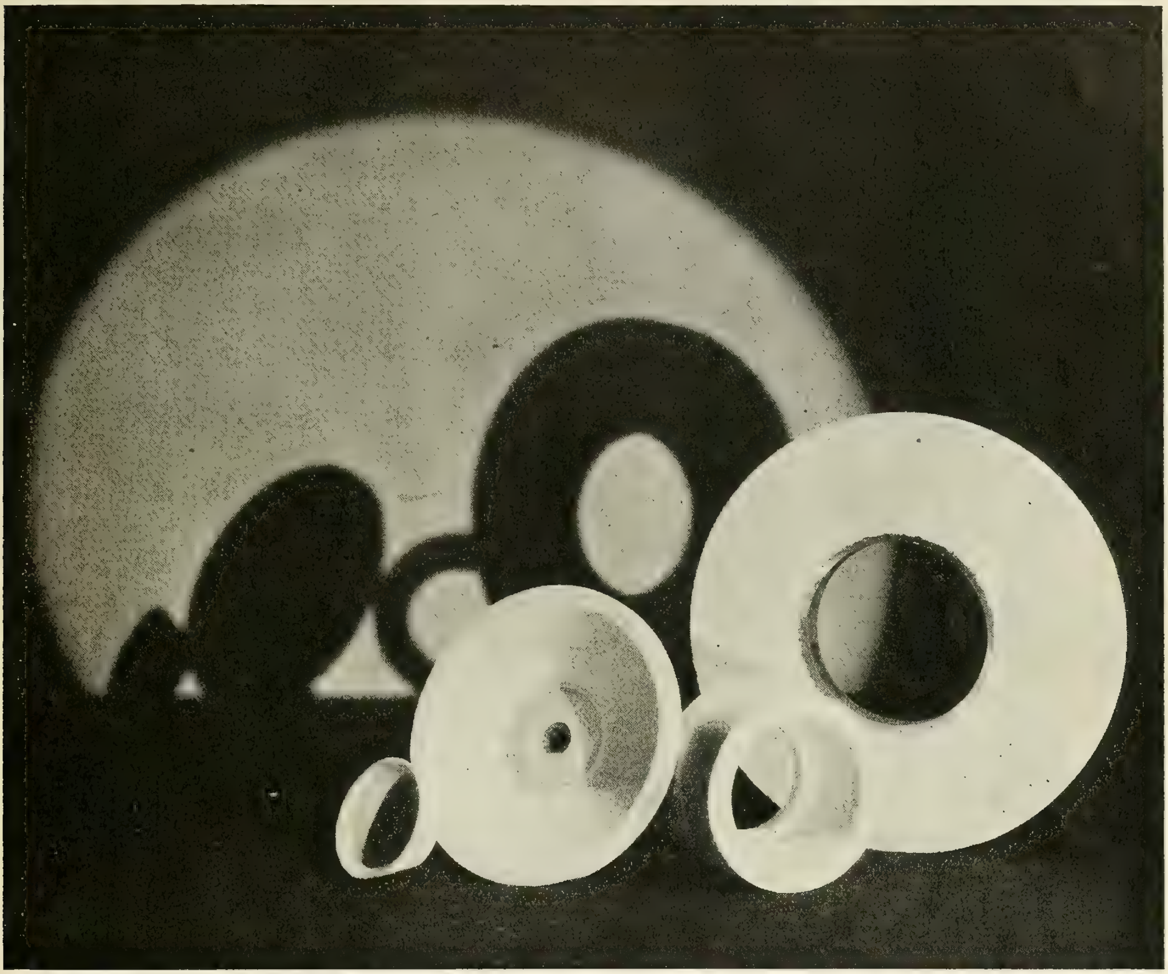
[H. H. HAMES]

JOSEPH STROBA, chief mechanic a Kansas City for National Air Transport, has resigned to go to Rio de Janeir where he will have charge of the overhaul shops of the New York, Rio and Buenos Aires air passenger line. Before going to his new post Stroba will spend three weeks at the Pratt and Whitney Company factory in a study of the aircraft engines made by that company.

WILLIAM S. GREEN has been appointed southern district sales manager by the Inland Aviation Company of Kansas City. Mr. Green is a captain in the Air Corps Reserve and was formerly airport manager of Fairfax Airport, Kansas City.

CONTROL of the Porterfield Flying School at Fairfax Airport, Kansas City, Kan., has been acquired by E. E. Porterfield from the Universal Aviation Corporation. The school was established on July 4, 1925, by Mr. Porterfield and was taken over on June 1, 1929, by the Universal corporation. The school was approved by the Depart-

(Continued on next page)



New high speed steels and cutting alloys create new grinding problems.

In Norton laboratories, trained technicians are constantly at work to improve yesterday's products and develop new grinding wheels for service today.

NORTON COMPANY
Worcester, Mass.

NORTON

Grinding Wheels
Grinding Machines

Refractories-Floor
and Stair Tiles

(*Missouri News continued*)

ment of Commerce on October 3, 1929.

MAJOR J. CARROLL CONE has been appointed vice president in charge of sales of the American Eagle Aircraft Corporation of Kansas City. Major Cone served as a pilot in the U. S. Army Air Service during the World War and has since been active in commercial aviation.

OFFICIALS of the Department of Commerce recently awarded the American Eagle Aircraft Corporation of Kansas City Approved Type Certificate No. 293 on the company's new three-place open cockpit biplane, Kinner powered. The plane was flight tested on January 23 at Fairfax Airport. The biplane developed a high speed of 130 miles an hour in loaded tests and has a 550-mile cruising radius.

ROY L. NAFZIGER has taken the sales agency at Kansas City for Bach trimotor planes. He has one of the ships, specially equipped, which he uses for business and pleasure. It is powered with a Wasp and two Wright Whirlwind engines. Mr. Nafziger has toured most of the United States in the last year, with trips to Mexico and Canada, in a cabin plane piloted by Fred Kane, Kansas City pilot.

ST. LOUIS

[A. W. League]

THE ground course at the Von Hoffman Flying School has been increased to twelve weeks, the price remaining unchanged. Announcement of the change in curriculum is made in a new thirty-two-page catalog issued by the school. It is also announced that several Spartan biplanes will be added to the equipment of the school.

REGIONAL sales headquarters for the Detroit Aircraft Corporation have been established at the St. Louis Municipal Airport. Ray Brown, sales manager for the district, has moved his offices from Parks Airport to the Ryan Aircraft Corporation's plant at the Municipal Airport. The change was made at the direction of James Work, general manager of the Detroit Aircraft Corporation, who was in St. Louis recently making a survey of the Ryan Aircraft Corporation and the Parks Air College.

ILLINOIS and Missouri representatives interested in the welfare of Scott Field were pleased that the War Department appropriation bill carries an amount of $78,450 for that field and they will not appeal to have the amount increased by $200,000. The $78,450 was included by the Bureau of the Budget, which had omitted the item on previous occasions. In the testimony of Major General J. E. Fechet, Chief of the Air Corps, appears the estimate in itemized form. It provides for the procurement of one airship of a type of 53,000 cubic feet capacity at $25,000; one airship envelop, $15,000; one balloon observation type, 50,000 foot capacity, $8,500; and four barrage balloons, $16,000, the balance being for equipment parts. The airships are to be the non-rigid type. The additional $200,000 is needed in order to commence a permanent building program.

FORMATION of the St. Louis Glider and Model Association, composed of schoolboys of St. Louis interested in model airplane building and gliders, has been completed by the Curtiss-Wright Service Division in St. Louis. The association has about forty boys on its roll. Officers elected to head the organization for the coming year are: Thos. Chalcraft, president; Christy Magrath, vice-president; Darwin Siegel, secretary and Carl Ehrhart, treasurer.

THE first comprehensive plan for development of the St. Louis Municipal Airport, for which a $2,000,000 bond issue was voted, has been presented to the St. Louis Municipal Airport Commission. The plan provides for a double set of runways and other improvements to cost a total of $1,138,500. With the thought in mind that this sum would not be available, a second estimate was submitted providing for a single set of runways and, less grading and drainage, at a total cost of $812,000. It is estimated that two years would be required to complete the original plan as submitted.

An air terminal building costing $150,000 is planned for the southeastern corner of the property near the Natural Bridge Road. No reduction in the cost of this item is provided in the secondary estimate. The building would serve as headquarters for airlines and other operators at the field and would be equipped with offices for the field manager, weather bureau, radio and other agencies. One of the innovations is that a tunnel is to be built from the proposed air terminal building to a point some distance out in the field and that passengers be sent through the tunnel and up on an elevator to a loading platform. That would eliminate the danger of passengers walking on the air field and would permit the use of planes with any size wing spread.

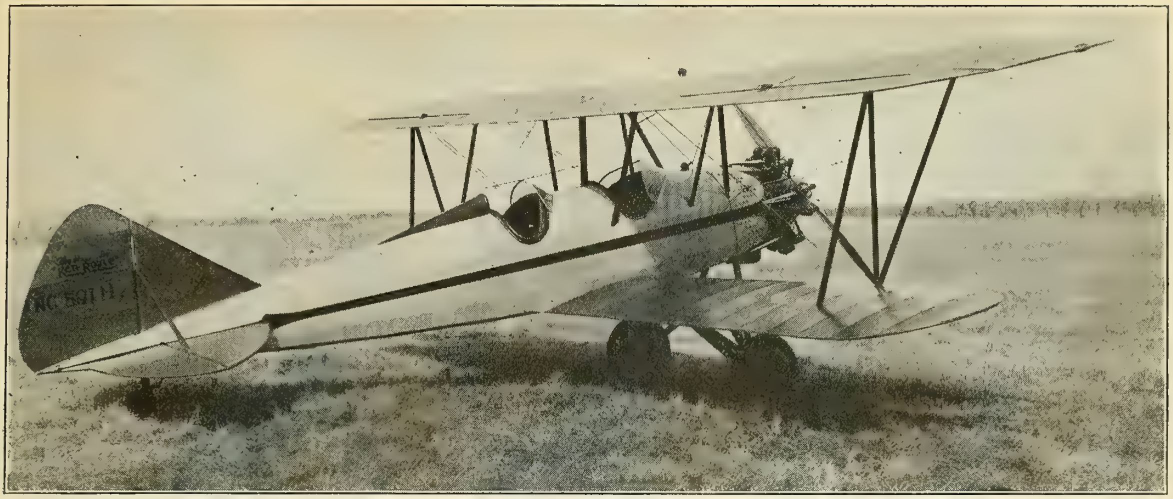
The plan also calls for the construction of a hotel and apartment building. The cost of the night lighting system is fixed at $50,000, both in the major and secondary estimates. Only the landing runways would be lighted. The take-off runways would remain dark so as to accustom the pilots' eyes to the darkness. Other items included in the estimates are $5,000 for sewerage; $15,000 for a cafeteria; $100,000 for roads, drives, landscaping and fences; $8,000 for a fire department building; $5,000 for fire fighting equipment; $2,500 for medical equipment and $2,000 for water supply. An item of $45,000 for grading is reduced to $35,000 in the secondary estimates and one of $20,000 for furniture and fixtures is reduced to $15,000 in the lower figures.

A MEETING for the purpose of discussing methods of testing and servicing aircraft engines was held by the Motor Manufacturers Section of the Aeronautical Chamber of Commerce at the Hotel Jefferson, St. Louis, Mo., on February 18. The meeting was held in conjunction with the International Aircraft Exhibition. Members attending the meeting discussed the establishment of a system of discounts for airplane manufacturers, distributors and service stations. The Motor Manufacturers Section held a joint meeting with the Commercial Airplane Manufacturers Section on February 20.

ARTHUR E. NELSON has been appointed assistant director of the St. Louis-Universal Flying School, operated by the Universal Aviation Corporation, according to a statement of Universal officers. Mr. Nelson was formerly principal of the ground school. He is a graduate of Bradley

(*Continued on next page*)

Aluminum Company's exhibit at the St. Louis air craft show, awarded first prize as the most attractive



THE UNMATCHABLE

Ken Royce

By REARWIN

STYLE and Stamina distinguish this thoroughbred of the Air. Judge for yourself its point-by-point supremacy.

Winner in every event entered against stock planes of equal horsepower, the Ken-Royce has definitely proven its leadership.

The Ken-Royce was easily the most outstanding bi-plane at the St. Louis International Air Exposition last month. Its trim, graceful lines are the result of proper engineering and perfect workmanship —tested many times in each operation.

A remarkably fast airplane with a still more remarkably slow landing speed. The kind of an airplane which wins enthusiastic approval from every pilot.

The Ken-Royce will outsell its competitors just as surely as it outperforms them.

A perfect franchise for this wonderful airplane means big opportunity for profit. Be sure and get the facts about the Ken-Royce before buying an airplane. We can prove to your entire satisfaction the outstanding merit of this ship which stands unchallenged in 100 performance tests.

Write for detailed information, specifications,
performance record, prices, etc.

REARWIN AIRPLANES Inc.
FAIRFAX AIRPORT
KANSAS CITY, KANSAS

(Missouri News continued)

Polytechnic Institute and served in the World War.

Walter Trefz, formerly affiliated with the H and H Machine Company of St. Louis, has been appointed director of the mechanics school of the St. Louis-Universal Flying School.

The St. Louis school has inaugurated an advanced course in aircraft rebuilding which is open to graduates of the ground school. The course as organized by Walter Trefz, director of the Universal ground school located in the downtown section of St. Louis includes bearing and lathe work, cylinder reconditioning, precision instruments, micrometers, and relignment of steel propellers.

R. F. HAYES of New York has been appointed sales representative in St. Louis for the Airport Equipment Sales Department of Curtiss Airports Corporation. Mr. Hayes' headquarters will be at the new Curtiss-Steinberg Airport on the East Side.

JOSEPH REED has been appointed sales manager for the Curtiss-Robertson Airplane Manufacturing Company of St. Louis. In his new capacity Mr. Reed will have charge of sales of Robin and Thrush planes. He sold planes last year for the Universal Aviation Corporation.

A. W. MANKEY, chief engineer for the Ryan Aircraft Corporation, has been appointed chief production engineer for the Detroit Aircraft Corporation, with headquarters in Detroit. Carl Beed, former assistant to Mankey, has been appointed his successor.

RALPH DAMON, production manager for the Curtiss-Robertson Airplane Company, has been appointed assistant to J. A. B. Smith, executive vice president of the Curtiss-Wright Corporation with headquarters in New York.

N. H. ANDERSON, stress analyst of the manufacturing division of Parks Air College, has been transferred to the engineering staff of the Detroit Aircraft Corporation, of which Parks Air College is a subsidiary. John H. Thomas, of the Parks engineering staff, has been transferred to the staff of the Ryan Aircraft Corporation at the St. Louis Municipal Airport.

NEBRASKA

[J. R. LOWELL]

DEVELOPMENT of three definite phases of commercial aviation is being undertaken in 1930 by the United States Junior Chamber of Commerce, supported by 130 affiliated organizations, according to H. F. McCulla of Lincoln, Neb., president of the national organization. Establishment of new airports, improvement of existing ports and the proper marking of cities, President McCulla lists as the three objectives.

Other organizations which are boosting aviation in Nebraska are the Nebraska American Legion and the Standard Oil Company. These bodies are launching an ambitious program which includes having a total of 341 Nebraska cities and towns air-marked by 1931.

THE Arrow Aircraft & Motors Corporation at Havelock, Neb., has adopted a direct from factory to purchaser sales policy for 1930, with a price cut on Arrow Sport planes. Under Arrow's 1930 sales plan, orders and deliveries will be placed and accepted through regional and territorial sales representatives. The franchise of the regional representative is to be limited to one state, and the territorial representative franchise to the county in which the airport from which they operate is located. An Arrow factory service depot will be established with each regional sales representative, and factory representatives will be appointed to visit dealers and complete the sales organization.

Arrow representatives named up to February for 1930 include the following: Harry I. Day, Roosevelt Field, L. I., factory representative in charge of locating and contacting representatives in the New England states, Pennsylvania, New York, New Jersey, Maryland, Delaware and the District of Columbia. Mr. Day also holds Arrow sales rights in the metropolitan New York District. Edgar Cate, Portland, Me., regional representative; North Shore Airways, Beverly Field, Boston, Mass., regional representative; Ted Kenyon, Municipal Airport, Boston, territorial representative; Miss Keet Mathews, Long Island Aviation Country Club, territorial representative; Eckerson Flying Service, Medford, Ore., regional representative for west half of Oregon; Saunders Fly-It-Yourself system, Fairfax Airport, Kansas City, regional representative; Fergus Falls Air Service, Inc., Fergus Falls, Minn., regional representative; Edwards Motor Company, Lexington, Ky., regional representative.

Several changes in factory arrangement have been made at the Arrow plant to facilitate increased production. The stockroom has been rearranged and a saw installed. All tubing will be cut in advance in the stockroom, and each workman will have an individual rack containing the special pieces of tubing he works with in the assembly line.

THE Kearney-Arrow Flying Service, Inc., of Kearney, Nebr., has filed articles of incorporation, with an authorized capital stock of $25,000. The corporation will conduct a flying school, a general airplane and accessories agency, maintain an air passenger and freight service, and has the privilege of laying out and developing airports. The incorporators are Kearney, Neb., business men, and the Arrow Aircraft and Motors Corporation will furnish all equipment, including airplanes for the school, and will supervise the project. A number of such corporations are planned for in 1930 by the Arrow organization.

QUARTERS for the trade school of the Arrow Aircraft and Motors corporation have been laid out and completely equipped at the firm's plant at Havelock, Nebr. J. E. McCullough, formerly at the head of manual training at Technical High School, Omaha, is chief instructor. Laboratory quarters, 60 by 60 feet, have been provided in the Arrow plant, which has 400,000 square feet of floor space. A ten-unit welding station has been installed along with engine racks and benches for wood and metal working. An additional space of 30 by 30 meet has been equipped for a class room. Courses offered include welding, engine mechanics, wood working, wing building, sheet metal work, and rigging and doping.

The Arrow company has established an experimental welding department at its plant with Pete Engel, formerly in charge of production and engineering for the Fleetcraft Airplane Corporation of Lincoln, Nebr., in charge. Recent orders from Arrow distributors and private concerns have brought factory contracts for Arrow Sports to 106. The Arrow company is now producing two planes a week and expects to boost production in March.

THE Mid-West Aviation Corporation of Omaha recently issued a statement showing that the company's income statement as of October 31, 1929, shows dividends on the preferred stock earned for the next three and one-half years and a preferred dividend set aside for the year ending October 1, 1930. The income has been equally divided among the activities of the firm. The company has acquired charge of the Grand Island, Nebr., flying field and has five main points of operation in Nebraska and Iowa. The other points are Des Moines, Council Bluffs, Omaha and North Platte. A contract to distribute Travel Air planes in Nebraska and Iowa has been made with the Curtiss-Wright Sales corporation by the Mid-West company.

IOWA

[R. W. MOORHEAD]

THE Des Moines Municipal Airport has secured automatic printers to furnish aviators with hourly reports on weather conditions throughout the Middle West. Some of the cities with which the printer system connects Des Moines are Chicago, Moline, Iowa City, Grinnell, Omaha, Kansas City and St. Joseph.

DETAILS have now been completed for acquisition by Council Bluffs, Iowa, of the 200-acre Dodge tract south of the city for a municipal airport. The city council has authorized the signing of $40,000 in airport

(Continued on next page)

Sturdy, easy-operating R-W Doors

Doors—*most important* hangar equipment

You want the sturdiest, easiest-operating hangar doors . . . at a cost in keeping with such service.

R-W doors slide noiselessly around the corner *inside* the hangar. They withstand severe treatment for years, provide every convenience plus economy and safety.

Regardless of the height and width of the opening, any doorway problem can be solved with R-W equipment . . . tin clad, sheet steel or SupeR-Way mill type doors . . . overhead trolley track or floor track, hangers, weatherstrip, bolts and hinges. Richards-Wilcox shoulders responsibility for the complete installation.

Do not hesitate to call one of our branches for free consultation with an R-W engineer, just as you call upon specialists in other phases of your business.

Richards-Wilcox Mfg. Co.
"A Hanger for any Door that Slides."
New York . . . . AURORA, ILLINOIS, U.S.A. . . . . Chicago
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(Iowa News Continued)

certificates and the acceptance of the deed to the land. A twenty-year one mill levy is estimated to make available $80,000 in certificates for the acquisition and development of the airport.

AFTER cutting $75,000 from the figure of $275,000 proposed for the purchase and maintenance of a municipal flying field at Des Moines, the city council has ordered the question submitted to a vote of the people. The sum of $275,000 was proposed by various civic groups in the city which recently began agitation for an election of the proposition.

In proposing that the figure of $275,000 be reduced to $200,000 for the ballot, Commissioner of Streets W. F. Mitchell declared that in view of the fact that conditions in the field of aeronautics change so fast that he thought the city should proceed with caution. The question will be included on the ballots at the regular city election, March 31.

THE U. S. Department of Commerce recently granted the Bolte Aircraft Corporation of Des Moines a license on its low-wing, two-passenger sport monoplane. The plane is of semi-cantilever type powered by a Kinner, five-cylinder, 100-horsepower engine. The wing spread is 32 1-2 feet. The ship was designed by Fred Huep, a German aeronautical engineer associated with the corporation.

MINNESOTA

[LYLE F. YOUNGSTROM]

NORTHWEST AIRWAYS, INC., moved its executive offices and operating headquarters from Wold-Chamberlain Field, Minneapolis, to its new $100,000 hangar and terminal at the St. Paul Municipal Airport during the early part of February. The firm is the first to operate its own hangar at the St. Paul field and the structure, with the one municipal hangar already completed and one new municipal hangar under construction, makes three modern hangars on the municipal port.

The Northwest Airways executive offices were moved from the Merchants Bank Building to the office building at the west end of the hangar structure where commodious offices have been provided. Machine shop facilities will be developed at the new location and the shop and hangar were to be in full operation by March 1. The new building includes a passenger station with ticket selling facilities so that passengers may go direct to the port and purchase tickets before stepping into the ships.

The Northwest Airways operates two passenger and mail lines to Chicago, a night mail line to Chicago, a branch mail and passenger line from Milwaukee to Green Bay, Wis., and a branch line from Madison, Wis., to Chicago by way of Rockford, Ill.

ACTIVE efforts toward organization of glider clubs throughout the Northwest with demonstration flights planned in communities near St. Paul as soon as weather permits, was determined upon recently at a meeting of the Great Northern Glider Club. The club's primary glider has been built entirely by members of the club. It is planned to manufacture gliders in the club's shop in the Great Northern aviation building in St. Paul.

[H. A. LINDBERGH]

THE extension division of the University of Minnesota is offering evening courses in aviation, all classes being held in the experimental engineering building on the University campus. The courses include airplane construction, aerial navigation, airplane engines and elementary aeronautics.

THE city of Duluth plans the erection of an administration building and hangar at the new 640-acre municipal airport which was placed in service during the past fall. The temporary hangar of the Arrowhead International Airways will be replaced by a permanent structure in the spring when a site has been approved by the city council. The Great Northern Aviation Corporation will also construct a hangar of a modern type, and its activities will be transferred to the airport from the Pike Lake Field, where they are being carried on at present.

THE Duluth city council has leased the Duluth Boat Club property on Minnesota Point and will develop it into a seaplane base. The Arrowhead International Airways, which has stressed the value of this site since its location there, will use it as a base of operations for their seaplanes during the coming spring.

EMIL S. GUSTAFSON, city commissioner, recently announced that a bond issue will be floated by Duluth during the coming spring to finance a five-year development program for the Williamson-Johnson Municipal Airport. The plans already submitted were considered too elaborate, and bids will be called for other plans from engineering firms that will be more suitable for the development. The city expended nearly $100,000 during 1929 on the airport, which included the construction of two 2,165-foot runways 500 feet wide. Top surfacing is to be completed in the spring and several buildings are to be erected.

WISCONSIN

[WILLIAM SCOLLARD]

A LEGISLATIVE air parley of the midwestern states was held in Milwaukee on February 24th and 25th. Major objectives of the parley were to seek uniform regulations, a permanent interstate aeronautical organization and harmony between commercial and legislative aviation interests.

Representatives of Illinois, Indiana, Ohio, North and South Dakota, Michigan, Minnesota, Iowa, Tennessee, Kentucky, Missouri and Arkansas were interested in the parley. The Department of Commerce, Aeronautics Branch, sanctioned the conference and sent Col. Harry H. Blee, director of aeronautical development, as its representative. Mr. Blee was one of the principal speakers.

ELLING O. WEEKS, president of the Weeks Aircraft Corporation, recently announced the appointment of Ralph N. Weil, as sales manager of the company. Mr. Weil served in the Navy during the world war, acting as observer on seaplanes carried by the U. S. S. *Indiana* doing convoy work with the Atlantic fleet.

DAN KISER, manager of the Milwaukee Air Terminals, Inc., the new 131-acre base of the Curtiss-Wright Flying Service now under construction, recently announced that the field will begin operation about May 1.

AIR ASSOCIATES, INC., of Chicago, Ill., has appointed Ted Lynn sales manager of its Chicago branch, according to a recent announcement. Les Lund was recently appointed to the sales staff of Air Associates and will be in charge of the salesrooms at Chicago.

THE Bureau of Aeronautics, Navy Department, completed a fifty-hour endurance run on the Comet engine produced by the Comet Engine Corporation of Madison, Wis., during February. The test was made to establish the rating of 165 horsepower on the new Series "B."

The engine ran forty-five hours at full rated power, and five hours at full throttle. It will next go on the dynamometer for calibration. The average horsepower was in excess of 165. The engine cooled satisfactorily with an air velocity of seventy-two miles per hour, and the cylinder head temperatures averaged 450 degrees Fahrenheit at the highest point.

ILLINOIS

[E. TILTON]

DIXON AIRPORT, Dixon, Ill., is now being designed by R. H. Humphreys, architectural firm of Chicago. The erection of a suitable hangar, a machine shop and service station are to be included in the designing of the field. Dixon Airport is skirted on the north by Lincoln Highway and is well adapted to a landing field, having recently been tiled to further improve drainage.

Dixon plans a dedication of the airport in the fall and a sum of $10,000 is now being solicited to finance the event.

NORTHWEST AIRWAYS, INC., will carry mail on the new spur of the air mail service to be started March 8 linking Madison and Janesville, Wis., and Rockford and Elgin, Ill., with Chicago. Northwest Airways will also extend its passenger service to include the Twin Cities with Winnipeg. The first plane was flown over the new route February 15.

Direct connection with the Winnipeg line will be available for Rockford passengers, as planes flying on the Chicago-Rochester-Minneapolis division will stop at the Fred

(Continued on next page)

Announcing
NEW LOW PRICES
on the improved
GREAT LAKES SPORT-TRAINER

THIS STEP marks a distinct turning point in aviation history. Now you can fly—and in the leader of the light plane class—*at the cost of motoring!*

The Great Lakes Trainer, already definitely established in the quality field, is one of the most popular ships in the air. Famous pilots buy it for personal use. Industry has adopted it for business flying. Flying schools show a marked preference for it—both for preliminary and advanced work.

In order to lead in extending the scope of the aviation industry—in order to lead in making flying possible for thousands who heretofore have been unable to afford it—the Great Lakes Trainer, 1930 Model, with many distinct improvements, *has been drastically reduced in price.*

was $4990

NOW

$3150

Fly Away Cleveland

A great, modern plant, straight line, standardized production and huge buying power—coupled with a willingness to forego large immediate profits for greater volume of business—make this new price possible.

Improvements incorporate the proved engineering advances made in the past year. The Trainer's famous dependability, easy maneuverability, smooth power and stunning appearance have all been greatly enhanced. The sensationally low price—$3,150—sets an entirely new standard for others to follow—and firmly establishes Great Lakes as the outstanding leader in a great movement to make flying truly universal!

Dealers seeking a fast-selling line of ships, under a unique, profit making Sales Plan, may have full information by writing us and giving complete details regarding their sales and business experience.

GREAT LAKES AIRCRAFT CORPORATION CLEVELAND

G L A C

Contractors to the United States Army and Navy

WITH THE HISE TRIMOTOR IN THE AIR

By Helen Giller

IT WAS below zero the day we went out to Pontiac Municipal Airport to take a ride in the Hise trimotor monoplane at the invitation of Mr. Fred Hise, producer of the ship. Snow lay on the level field and outside the hangar a plane was warming up. Inside, Al, the pilot, was oiling up the Hise ship—a handsome red and silver monoplane.

They wheeled the ship out in front of the hangar and I had a chance to look at it with a side view. In length thirty-two feet, two inches, overall; and a wingspread of fifty-two feet. A nice sweep of line extends from the three motors up front to the rudder in the rear. They warmed up the motors—three Kinners, each one hundred "horse." Finally came that preliminary racing of each engine in turn which warned me it was time to climb into my gloves. We staggered out in the wind. There is a door on each side of the plane, six seats, and a baggage compartment in the rear—even a place for golf clubs. The interior is finished in red leather, with dome lights and ash trays in silver.

After taxiing a bit, we turned around and then Al gave her the gun and we hurried up the field. Suddenly we zoomed, and then climbed and climbed—as easily as walking upstairs. There was a haze that day, so we stayed at a good conservative 1,200 feet. Pontiac went by at one hundred miles an hour. There was the road we had lately crept over in our automobile.

And here we were, four of us, comfortably seated in a heated cabin, talking and smoking. The pilot took his hands off the controls and we flew along straight and true, the three engines purring. There are four gas tanks, each holding twenty-five gallons. Each engine has its tank, and the reserve can be turned on to feed one, two or all three of the engines. Gas gauges are inside the cabin. Over the controls, the top of the cabin is made of glass, so that you have clear vision above. The ship's service ceiling is 10,000 feet;, and some day I'd like to explore up there.

Al cut first one motor, and then the other, and the ship flew perfectly with two motors functioning. Finally he cut the two side motors at once, and left the burden on the one in front; at that, we lost altitude at only fifty feet a minute.

I guess Al finally got tired riding around, so we headed back to the airport. He made a perfect landing and said "Terrible!" which is his regular comment.

(Illinois News continued)

Machesney Field on signal with the inauguration of the air mail service. Previously the planes have not flown directly over the Rockford airport.

A tax to provide for the purchase of the Fred Machesney Airport by the Rockford Park district is now being advocated. Election on the issue will come up April 1. A half mill tax is under consideration. Legislation by the last state legislature provided that park boards might include airport operation in their list of duties.

The Rockford airport is now equipped with the 1,500,000-candlepower revolving beacon donated by the Rockford National Bank which is encouraging the proposed park board operation of the local airport.

THE C. F. Pease Company of Chicago, Ill., has developed and begun the manufacture and distribution of the Peerless Model 30 Blue-printing equipment, designed to produce blueprints, negative prints, and blue line and brown line prints.

THE Edgewater Flying Club, Inc., has moved offices, clubrooms and classrooms from 3410 Montrose Ave., Chicago, to 357 La Salle Street, according to a recent announcement of the organization's officials. The change of location was included in plans to meet the requirements of the Department of Commerce for ground and flying schools, the announcement stated.

MICHIGAN

[K. F. Zeisler]

MICHIGAN'S three largest air services ran up a total of 1,254,596 flight miles during 1929. Thompson Aeronautical Corporation, operating C. A. M. 27 and an amphibion passenger service between Detroit and Cleveland, accounted for 600,367 miles; Stout Air Services, Inc., operating passenger planes from Detroit to Cleveland and Chicago, with local service on the Chicago Lines, had 410,535 miles, and the Ford Motor Company, freight service linking Ford assembly plants to Detroit, had 243,694 miles. Stout reported 34,362 passengers as compared with 46,782 in 1928, the decrease being in sightseeing traffic. With the lowest fares in history, Stout expects an increase in patronage of scheduled lines in 1930. The Ford freight planes carried 1,298,951 pounds of freight, an increase of 300,000 pounds over 1928.

COMPLETION of airway lighting on two Michigan airways is announced by F. C. Hingsburg, chief engineer of the airways division of the bureau of lighthouses. Beacons have been installed at ten-mile intervals, with intermediate landing fields every thirty miles, on the Detroit-Kalamazoo-Chicago line and on the Toledo-Bay City line.

FOSTER AIRWAYS CORP., Lansing, will inaugurate daily passenger service between Lansing and Detroit, Chicago, Grand Rapids and Muskegon, May 1. The organization has arranged a hookup with TAT-Maddux, Universal, Stout, Western Air Express, Embry Riddle, Boeing, Thompson and Koehler airlines, permitting sale of through tickets to any point in the country. Connections will be made with all planes of these lines at terminal points on Foster Airways.

PUBLIC schools at Battle Creek, Mich., are sponsoring a night class in aviation. Pontiac Airport will have a ground school this spring directed by Capt. M. A. Sine, Detroit, which will be affiliated with the J. A. N. Aircraft school.

[Rollin Fairbanks]

CAPT. FRANK HAWKS recently spent several days in Ann Arbor, Mich., receiving instruction from Wallace Franklin in handling a glider towed by an airplane. He purchased a secondary type glider from Prof. R. E. Franklin and plans to be towed across the continent. The trip will not be made against time but will include as many cities as possible where gliding demonstrations will be given. While in Ann Arbor Capt. Hawks used the frozen surface of Barton Lake for landing and taking off. The glider was launched from behind an automobile, and upward wind currents created by nearby hills assisted him in making flights of several minutes' duration.

A MEETING of the stockholders of the Flo Flying Services, Inc., of Ann Arbor, was recently held in Detroit. Lieut. Leonard S. Flo, president of the organization, reviewed the company's activities during the past year and outlined the program for the coming season. Besides Lieut. Flo, who is chairman, those elected to the new board of directors are: Dr. Neil Gates, Michael Fritz, J. W. Edwards, Newton Skillman, Major Lanphier, and Austin S. Bement.

(Continued on next page)

Strange How We All Ultimately Return to the Things That Serve Us Best!

BY
E. B. GALLAHER
Treasurer of Clover Mfg. Company
Editor, Clover Business Service

The Jazz Age we have just passed through brought with it a number of grinding compounds claimed to be "world beaters." They lasted until the Government adopted standard specifications based on actual work value instead of on bluff. They were then ruled out—because a grease-mixed compound cut $3\frac{7}{10}$ times faster than all others, and did a better job.

Then Commander Byrd and Captain Wilkins took only Clover Grease-Mixed Grinding Compound with them on their South Polar Expedition—as they had previously done when they went to the North Pole.

Not so inspiring, possibly, but just as important is the conditioning of airplanes at home. In this connection the following letter speaks for itself:

> *"We have been using Clover Valve Lapping Compound for lapping the valves on some 1500 Liberty-12 Aircraft Engines which we have reconditioned for the U. S. Army Air-corps in the past and we are now working on an order of 1300 of these engines.*
>
> *I believe it is one of the most difficult valve jobs on engines of this type, as the valve must be tight when subjected to an air pressure of 50 to 75 pounds. The valve is about 2 3-4 inches in diameter with a stem of only 7-16 inch diameter. The cylinder seat is steel as is the valve and great care must be exercised to keep the valve and seat from gaulding when finishing the valve by polishing. At one time I tried some ten different kinds of materials for valve lapping but found Clover grades 'E' and 'A' to do the best job.*
>
> *Very truly yours,*
>
> *THE STEEL PRODUCTS ENGINEERING CO.*
> (Signed) *J. R. Strong, Motor Dept."*

You might as well have the best—costs no more to buy, and nothing to try.

E. B. GALLAHER:
Clover Mfg. Co., Norwalk, Conn.
You may send me, without obligation:

☐ Sample Clover **Grease-Mixed** Grinding Compound—the kind the Government is buying.
☐ Clover **Water-Mixed** Valve-Grinding Compound. In its class, there's nothing better.
☐ **Green-Stripe** Sandpaper.
☐ **Red-Stripe** Turkish Emery Cloth—for polishing.
☐ **Yellow-Stripe** Aluminous Oxide Cloth—for cutting hard metals. The universal shop abrasive.

Name
Address
Character of business

(Michigan News continued)

PRODUCTION of the Stinson Aircraft Corporation of Wayne, Mich., will be increased over three hundred per cent during 1930, according to a recent announcement of William A. Mara, vice president of the company. The production schedule of the company includes the manufacture of three hundred airplanes during the first four months of 1930, and orders for parts and raw materials totaling in excess of $1,500,000 have been placed by the firm to fill the production schedule.

The company recently completed the reconstruction of its entire plant at Wayne and added several thousand dollars worth of equipment in its program of expansion. New paint and varnish rooms have been added to the factory and space for storing airplanes and parts has been provided. More than four hundred workmen are employed in the plant and the production of the company has reached twenty planes weekly.

The Stinson Company merged with the Cord Corporation in October, 1929. The Cord Corporation is the holding and management company for Auburn, Lycoming, Duesenberg, Spencer Heater, Limousine Body, and other companies in the automotive field, and has assets totaling $28,000,000.

The Stinson Company will produce in 1930 six models of the enclosed cabin type. Three models of the Stinson-Detroiter Junior will be offered. These models will be powered respectively with a 225-horsepower Wright Whirlwind engine, a 300-horsepower Whirlwind, and a 210-horsepower Lycoming engine. Two models of the Stinson-Detroiter Senior type will be produced; one a six-place cabin plane, powered with a 300-horsepower Wright Whirlwind, and the other an eight-place cabin type fitted with a 425-horse-power Pratt and Whitney Wasp engine. The company will also produce a trimotor plane, which will be ready for delivery about April 1.

F. B. Rentschler has been named chairman of the board of directors of Stout Air Services, Inc., operator of Stout Air Lines between Cleveland, Detroit and Chicago. Mr. Rentschler is president of United Aircraft and Transport Corporation of which Stout Air Services, Inc., is a subsidiary company.

The officers of Stout Air Services, Inc., include William B. Stout, president; William B. Mayo, vice president; Stanley E. Knauss, vice president, treasurer and general manager; and Donald J. Rogers, secretary.

SIX hundred and twenty-five hours of running at full throttle were completed recently by three Continental Model A70 engines in a destruction test conducted at the experimental laboratories of the Continental Motors Corporation, Detroit, Mich. Model A70 is a 165-horsepower aircraft engine produced by the Continental corporation. When the engines complete the test an inspection and analysis of the various parts will be made.

MRS. CLAIRE FAHY has been appointed saleswoman for the Eastman division of the Detroit Aircraft Corporation and will demonstrate Eastman Flying Yachts. Mrs. Fahy is the wife of Herbert Fahy, chief test pilot of the company, and has been an airplane pilot for six years. S. D. Eurich has been appointed sales representative of the Eastman and Parks aircraft division of the Detroit Aircraft Corporation in the Detroit district. He was formerly affiliated with the Fairchild corporation.

Plans for Third All-American Aircraft Show

THE third annual All-American Aircraft Show will be held in the new municipal hangar and exposition building located on the Municipal Airport at Detroit, Mich., April 5-13. Construction of the building containing the hangar and exhibition hall was recently completed at a cost of $1,000,000, and dedicatory ceremonies will be held on the opening day of the All-American show. Over 175,000 square feet of floor space will be provided for the exhibition of aircraft and approximately 20,000 square feet will be devoted to the display of aircraft accessories. The show is sponsored by the Detroit Board of Commerce.

Planes flown to Detroit for exhibition at the show may land on the field and taxi into the building, according to an announcement of the show management, or may be shipped to Detroit and obtain trucking service to the airport from a railway terminal which is located adjacent to the field. Planes shown at the exhibition may be demonstrated at the airport.

In the organization of the All-American Aircraft Show special attention has been devoted to the automotive industry and a day at the show will be set aside in honor of executives in the automobile industry who will attend the show with their sales organizations and discuss as a group the problems of distributing aircraft. To extend the scope of the exhibition, leaders in the aviation industry in Canada and Mexico have been requested by the management of the show to participate in the exhibition by attending the show and displaying products.

OHIO

ALUMINUM Industries, Inc., of Cincinnati, Ohio, recently completed plans for the expansion of the company, including an increase in the capacity of the company's plant. Aluminum Industries will increase the production in the permanent mold foundry and the machine shop, and has let contracts for the construction of two buildings to accommodate the increased activity in these two departments of the company's activities.

The buildings will cost approximately $100,000 and will add more than 30,000 square feet of space to the present floor space of the factory. They will be built of steel and will be of saw tooth construction to secure maximum sunlight. Work of excavating and grading the foundation has been started and the buildings will be completed by May 1. More than one hundred additional employees will be added to the company's pay roll when the increased production is started.

THE Post Office Department will authorize emergency air mail transportation between Kelley's Island in Lake Erie and Sandusky, Ohio, on the mainland, whenever conditions make water transportation impracticable, W. Irving Glover, Second Assistant Postmaster General recently stated. A petition, signed by 200 voters of the island requesting daily air mail service had been forwarded to Mr. Glover's office. Autos and sleds have been used to supply the islanders with their mail and other commodities during the winter time.

AEROL shock absorbing struts have been made standard equipment on the Emsco Cirrus light sport and training plane manufactured by the Emsco Aircraft Corporation of Downey, Calif. Aerol struts are manufactured by the Cleveland Pneumatic Tool Company, at Cleveland, Ohio.

THE Thompson Aeronautical Corporation has been appointed distributor in Ohio and Michigan for Summerill aircraft tubing by Edgar T. Ward's Son's Company, manufacturer of the aircraft tubing, according to a recent announcement by Richard C. "Tex" Marshall, vice-president and general manager of the Thompson company. The Thompson contract authorizes the sale of tubing to repair and rebuilding stations throughout the two states.

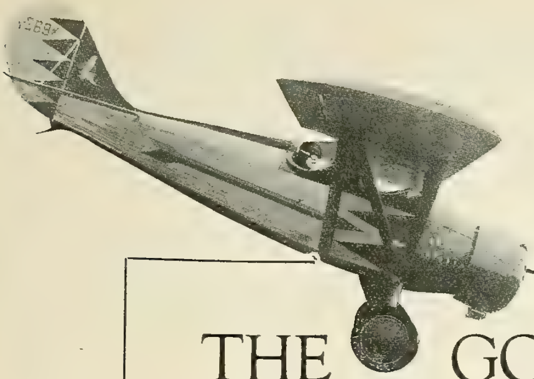
THE Dayton Chamber of Commerce has started a campaign to increase the air mail poundage carried on the route between Cleveland, Ohio and Louisville, Ky., by Continental Airlines, Inc. The movement to increase the air mail poundage was started as the result of Department of Commerce data showing that Dayton is next to the lowest of cities on the route in respect to air mail poundage.

THE Chicago office of the Reliance Manufacturing Company of Massillon, Ohio, has been moved fom 736 Peoples Gas building to the Straus Building, Chicago, according to a recent announcement of company officials. The office will continue under the supervision of E. C. Gross. The company manufactures and distributes Kantlink lock washers.

EXPANSION of work in mechanical engineering to include three courses in aeronautical engineering is announced at Ohio State Universty. The courses are open to seniors in the college of engineering. They will be taught by Asst. Profs. Karl W. Stinson and Andrew J. Fairbanks.

To the three new classroom courses it is hoped soon to add laboratory work, according to Prof. F. W. Marquis, chairman of the department. The three courses being given deal respectively with automobile and airplane engines, with aircraft construction

(Continued on next page)



THE GOLDEN EAGLE FLIES EASTWARD

THE widespread demand for the GOLDEN EAGLE Monoplane has necessitated the removal ot our factory from Inglewood, California to Columbus, Ohio. From this central point deliveries can be made quickly to any part of the country and large scale production will begin at once.

Territorial assignments are now being made and we will be glad to hear from responsible dealers and distributors. A unique plan of operation offers special inducements.

The performance and controllability of the GOLDEN EAGLE make it an ideal sport or training plane. Perfectly streamlined and dual controlled, this high wing monoplane is an example of expert craftsmanship. Construction features include direct tubing aileron control, adjustable stabilizer and oleo type landing gear.

The LeBlond-powered GOLDEN EAGLE has a high speed of 118 m.p.h. and a climb of 1200 ft. per minute. It is an excellent buy at $3950. Models now under construction will be equipped with Kinner, Wright Gypsy and other engines of similar weight and power.

VALUABLE
DEALER FRANCHISES
OPEN

THE
GOLDEN EAGLE
AIRCRAFT CORP.

R. O. Bone, *President*

PORT COLUMBUS
COLUMBUS, OHIO

Pacific Coast Representative:
J. J. Bouey, West Coast Aviation, Inc. 402 Seaboard Building, Seattle, Washington

(*Ohio News continued*)

and operation, and with airplane stress analysis and design.

YOUNGSTOWN AIR COLLEGE, INC., of Youngstown, Ohio, recently opened an office and school in the downtown section of the city where technical and mechanical subjects will be given to students enrolled in flying courses and to ground school students studying airplane mechanics. The company recently acquired 315 acres of land east of the city which will be developed into a field for the use of flying students. Lighting and general development is scheduled to be completed about March 15.

HAL W. REYNOLDS has been appointed factory representative by the Taft-Peirce Manufacturing Company of Woonsocket, R. I., and will establish headquarters at Cleveland, Ohio, where he will carry a representative stock of gages, magnetic chucks, reamers and tool room equipment manufactured by the Taft-Peirce company. Mr. Reynolds will represent the company in the northern part of Ohio.

L. F. Ross Heads Publicity Department of Cleveland Pneumatic Tool Co.

ESTABLISHMENT of a public relations department and appointment of L. F. Ross as director, has been announced by L. W. Greve, treasurer of the Cleveland Pneumatic Tool Co., Cleveland, Ohio, makers of Aerol struts. The new department will care for advertising and publicity. Mr. Ross resigned as state and aviation editor of the Cleveland *News*, a dual post he had filled for six years, to accept the appointment effective Feb. 1. He is a former pilot of the British Royal Flying Corps and served on anti-submarine patrol of the North Sea during the war.

As one of the original glider enthusiasts in Ohio he served as director of the first national glider contests held during the August air races in Cleveland. He is president of the Cleveland Glider association and a member of other local aeronautical organizations.

COLUMBUS

[W. D. WALTER]

THE T. A. T. passenger list from Port Columbus has shown a marked increase since the recent reduction in fare to a level comparable with first-class rail travel. On several occasions it has been necessary to run two sections into or out of Port Columbus.

FOLLOWING the election of J. L. Maddux as president of the T. A. T.-Maddux Lines, the appointment of St. Clair D. Welsh as superintendent of the eastern division, with headquarters at Columbus, was announced. Mr. Welsh, who was formerly superintendent of the western division, succeeds John Collings who has resigned, effective March 1st. It is expected that all offices of the eastern division will be concentrated at Port Columbus in the near future.

PORT COLUMBUS was recently inspected by Mayor Sullivan of Indianapolis, together with other officials of that city. Indianapolis is contemplating an airport project, and the trip to Columbus was made for the purpose of ascertaining the layout and methods of operation here. Mayor Sullivan was so impressed with the Columbus field that he returned for a second visit the following week.

THE Columbus Automobile and and Airplane Show was held in Exposition Hall, Ohio State Fair Grounds, from February 8th to 16th. This is the first time that a display of aircraft and accessories has been held in this city in connection with the annual automobile show. There were several interesting exhibits, and, to a biased observer, they appeared to be attracting more attention than the automobiles.

Curtiss-Wright Flying Service displayed two Robins, a DeHaviland Moth, and a Monocoupe. The scale-model Robin, mounted in the air-stream from an electrically-driven propellor, attracted as much attention as did the full-sized ships. This model can be made to take off, maneuver, and land by proper handling of the full-sized set of controls.

Buckeye Airways, Inc., of Columbus, which operates Clickenger Field, had a TP Swallow on display. A Waco 225, owned by C. L. Morris, president of the Aero Club of Columbus, constituted part of the Aero Club's exhibit. The Club also showed a primary glider, which attracted considerable attention. A. J. Frame, local distributor for the Whittlesey Avian, exhibited an Avro Avian, equipped with slotted wings and airwheels. George D. Wanner & Company of Dayton had a number of interesting flying model airplanes. The Outdoor Army and Navy Store displayed all kinds of flying equipment, helmets, goggles, uniforms, boots, and ornaments. The Franklin exhibit included a Curtiss Challenger engine mounted on a stand, and beside it, the engine of the new Franklin.

THE factory of the Golden Eagle Aircraft Corporation has been moved from Inglewood, Calif., to Port Columbus, Ohio, according to a recent announcement of officials of the company. The company will reorganize its distribution system and will grant franchises to aircraft distributors and dealers. The Golden Eagle Aircraft Corporation manufactures the Golden Eagle Monoplane powered with a LeBlond engine. Application will be made in the near future for Approved Type Certificates covering the Golden Eagle ship equipped with Kinner and Wright Gipsy power plants.

MASSACHUSETTS

[W. S. ROGERS]

A REVIEW of the general aviation activities in Massachusetts and sales in the New England territory chiefly distributed from Boston, shows that New England is fast becoming more important as an aircraft sales market with the new opening of airports. Land near the principal cities is not available or is not suited for flying fields as it is more generally in the West. But finances are at hand and recent airport additions which will be in use this spring make the outlook most favorable.

Boston has been laboring with runways 1,500 feet long with planes waiting for turns to take off and land. Bowles field at Springfield will be a welcomed addition to this territory. The New Bedford-Fairhaven Airport, just opened, offers room enough for transport operations, and Waterbury, Conn., is to have its airport soon. Two flying fields of ideal location are being completed in Maine. Massachusetts, and New England generally, are just becoming interested seriously in aviation as flying facilities are opened.

The 1929 business reports of the principal Boston operators are as follows: Skyways, twenty-four ships, eighty-four students, $225,000; East Coast Aircraft Corp., twenty-five ships, motor service ($30,000), $160,000; Curtiss-Wright Flying Service, twenty-seven ships, 134 students, transport operation, $360,000; and other operators, $75,000; making a total aviation business for 1929 in Boston of $810,000.

ROBERT G. ERVIN, formerly head of Curtiss-Wright Flying Service of New England, recently announced plans for the formation of an aeronautical firm to operate in the New England territory. Parker McGrevy, formerly chief of service and maintenance at Boston; P. H. Spencer, New England sales manager; Robert F. Foote, New England traffic manager and Boston sales manager; and William Harris, assistant traffic manager, resigned from the Curtiss organization to join Major Ervin in the formation of the new company.

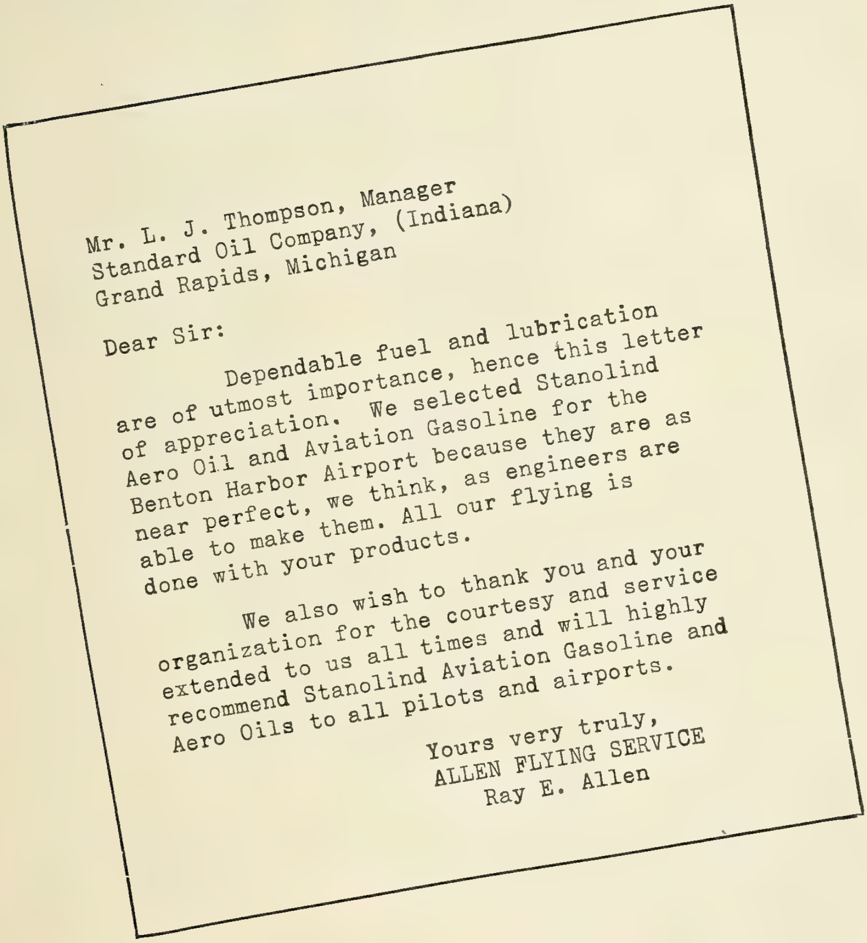
A POWERED glider will be constructed by the evening class in airplane construction at the Massachusetts Institute of Technology, Cambridge, Mass., which will start on March 4, according to a recent announcement of officials of the university. The course will be given under the supervision of Myron S. Huckle, instructor in aeronautics. He was formerly ground school instructor for the Curtiss-Wright Flying Service.

AN AIR tour of New England May 28-29, dedication of the Bowles airport at Agawam on May 30, and air races on May 31 and June 1, have been announced jointly by the Aeronautical Development Committee of the New England Council, Springfield Chapter of the National Aeronautical Association, and the Springfield Air Races Corporation, sponsors of the scheduled events.

The air tour will be held under the auspices of the New England Council and will be included in the council's program to promote aviation in New England. The tour is scheduled to start from the airport at Springfield, Mass., on May 28th, the route of the flight including the principal cities and towns of the six New England states. The tour will end at Bowles airport on Memorial Day.

(*Continued on next page*)

Another Airport Recommends Stanolind Aviation Products



Mr. L. J. Thompson, Manager
Standard Oil Company, (Indiana)
Grand Rapids, Michigan

Dear Sir:

Dependable fuel and lubrication are of utmost importance, hence this letter of appreciation. We selected Stanolind Aero Oil and Aviation Gasoline for the Benton Harbor Airport because they are as near perfect, we think, as engineers are able to make them. All our flying is done with your products.

We also wish to thank you and your organization for the courtesy and service extended to us all times and will highly recommend Stanolind Aviation Gasoline and Aero Oils to all pilots and airports.

Yours very truly,
ALLEN FLYING SERVICE
Ray E. Allen

Every Sunday afternoon between 2:00 and 3:00 P. M., central standard time, the Standard Oil Company (Indiana) will broadcast the incomparable music of the Chicago Symphony Orchestra over the following stations:

WGN	Chicago
WWJ	Detroit
WTMJ	Milwaukee
KSD	St. Louis
WOC	Davenport
WHO	Des Moines
WEBC	Superior
KSTP	St. Paul-Minneapolis
WDAF	Kansas City
WOW	Omaha

For Quick Service
Use Air Mail

TODAY Stanolind Aviation Gasoline and Aero Oils are well known at midwestern airports and preferred by the majority of pilots. These men know that they can rely on the supreme quality of Stanolind Aero Products as their best insurance against engine trouble.

STANDARD OIL COMPANY (*Indiana*)

General Offices: **910 South Michigan Ave. Chicago, Illinois**

Chicago
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Kansas City
La Crosse
Mankato
Mason City
Milwaukee
Minneapolis
Minot
Saginaw
Sioux City
Peoria
Quincy
South Bend
St. Louis
St. Joseph
Wichita

323

(Massachusetts News continued)

Dedicatory ceremonies at Bowles airport on May 30 will include the completion of the air tour and will be held under the auspices of the Springfield Chapter of the National Aeronautical Association. An air show which will include air races will be held at Bowles airport on May 31 and June 1 under the supervision of the Springfield Air Races Corporation.

WALTER S. ROGERS of Boston has renewed his distributor's contract for the states of Maine, Massachusetts and New Hampshire with the Davis Aircraft Corporation of Richmond, Ind., manufacturer of Davis monoplanes. Mr. Rogers at the time of renewal took delivery on a Davis D-1 monoplane and placed an order for a Davis D-1-K powered with a Kinner engine. Walter S. Rogers and Associates operate a flying school at the Municipal Airport, Boston, in addition to their sales activities.

DURING the twelve-month period ended January, 1930, a plane operated by the Red Wing Flying Service, Inc., of Ware, Mass., carried 28,000 passengers without an accident, according to a recent announcement of officials of the company. The Red Wing company operates aerial transport, taxi and sight-seeing services, an aerial photographic service, supervises flying instruction and distributes aircraft accessories. It is distributor for American Transport aviation goggles.

CONNECTICUT

O. C. CHRISTIANSEN has been appointed Western representative of the Pratt & Whitney Aircraft Company, of Hartford, Conn., according to a recent announcement of B. H. Gilpin, service manager of the company. Mr. Christiansen was formerly assistant service manager of the Pratt and Whitney company, and will succeed E. B. Haines as Western representative. J. L. Bunce will succeed Mr. Christiansen and C. G. Runyon, formerly service department representative at Chicago, will be in charge of the work formerly supervised by Mr. Bunce at Hartford.

THE Stanley Electric Tool Company of New Britain, Conn., a subsidiary of the Stanley Tool Works, recently announced that it will manufacture and distribute drills, screwdrivers and grinders developed and manufactured formerly by the Stanley Rule and Level Plant.

THE manufacturing facilities of the Moth Aircraft Corporation will be moved from Lowell, Mass., to St. Louis, Mo., where the company will continue the production of Moth planes in the manufacturing plant of the Curtiss-Robertson Aeroplane Manufacturing Company, according to a recent announcement of Richard F. Hoyt, chairman of the Curtiss-Wright group. The Moth corporation and the Curtiss-Robertson company are subsidiaries of the Curtiss-Wright Corporation.

The Moth company's manufacturing activities are to be transferred from Lowell to St. Louis to secure the advantage of being adjacent to the factory of the Wright Aeronautical Company at St. Louis, which produces the Gipsy 100-horsepower engine used in the Moth plane. The Curtiss-Robertson company will continue the manufacture of Curtiss Robin planes at the factory in conjunction with the production of planes by the Moth corporation.

Arrangements have been completed to continue the manufacture of Moth planes at the plant at Lowell until production has been started at the Curtiss-Robertson factory, in order to maintain the production schedule of Moths without interruption. The present personnel of the Moth Aircraft Corporation will continue to supervise the manufacture of Moth planes at the new location.

CHANCE VOUGHT CORPORATION, unit of United Aircraft and Transport Corporation, reports net airplane sales of $3,138,000 during 1929. This sales total exceeds the former high total, made during 1928, by almost 10%. With the exception of a portion of the export shipments, the sales reported do not include the cost of engines, propellers, instruments and accessories, as on Government orders these items are usually furnished to the contractor.

A feature of Vought sales for 1929 was the rapid expansion of the company's export business, such shipments for the year approximating a million dollars, compared with about $200,000 in 1928. During the year, Vought planes were delivered on repeat orders to the Argentine, Cuban, Chinese, Mexican and Japanese governments. While Vought planes have been used in South America for some years, the sales to the Orient during 1929 opened an entirely new field. Several contracts for Vought Corsairs are now under negotiation with South American countries, and the company reports prospects for additional expansion of Vought exports during the new year.

The current unfilled orders on the Vought company books are $1,500,000, over $1,000,000 of this business having been booked within the past thirty days, according to a statement of Vought officials.

APPROVED Type Certificate No. 39 was recently issued by the Department of Commerce for the Wasp Junior, a 300 horsepower radial air-cooled aircraft engine manufactured by the Pratt and Whitney Aircraft Company of Hartford, Conn. The certificate was issued after the engine had completed a fifty-hour endurance test and a ten-hour flight test.

The Wasp Junior was run at full throttle during the specified periods of the test and developed more than ten per cent in excess of the guaranteed rating of 300 horsepower, without indications of vibration at any speed. For the flight test the engine was installed in a Vought Corsair.

PENNSYLVANIA

THE Second Annual Pittsburgh Aircraft Show will be held at Motor Square Garden, Pittsburgh, Pa., March 6-15. The show is sponsored by the Aero Club of Pittsburgh and Ray Krimm has been appointed director of the exhibition. Ninety per cent of the companies who participated in the First Annual Pittsburgh Show held in March, 1929, will exhibit in the 1930 show, according to Mr. Krimm, and twice as much floor space is available to exhibitors this year.

Included in the general committee of the Second Annual Pittsburgh Aircraft Show are the following: Mayor Charles H. Kline, Joseph G. Armstrong, Capt. William J. Austin, general chairman of the show committee; Louis T. Barry, Raymond A. Tucker, Edward W. Thomson, Robert A. Laedlein, William B. Rodgers, Bertrand H. Smyers, Jr., Clifford Ball, Edward Ball, Halsey R. Bazley, Prof. A. H. Blaisdell, Col. Harry C. Fry, Jr., Lieut. Samuel C. Eaton, Norman F. Brown, Ralph F. Dawson, W. Heber Dithrich, John W. Donahey,

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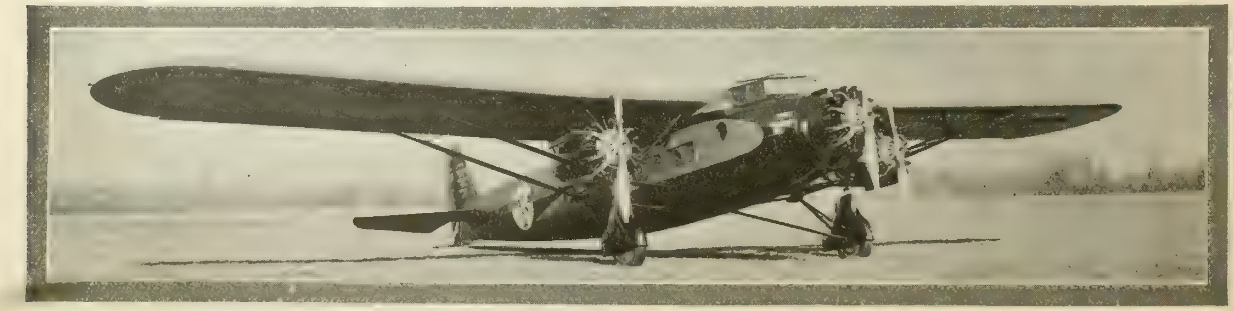


Keystone Patrician delivered recently to the Wright Aeronautical Corporation to be used as a flying office

Porterfield

Modernizes Flying Schools!

THE PAY-AS-YOU FLY AVIATION SCHOOLS FIT YOUR PURSE! In modernizing flying schools, Porterfield Flying schools have originated a system of flight instruction permitting you to pay as you fly. No big initial down payment on a flying course. No delays while the others in the class get their flying time. A speedy, sure and personalized flying school—and a chain of them throughout the nation, all affiliated with Porterfield Aviation Interests, Inc.

Five years' flying school operation experience places Porterfield in an enviable position. Hundreds of well known pilots, mechanics, salesmen and executives in the industry started with Porterfield training. Hundreds of students have been soloed without serious mishap.

Doctor, lawyer, merchant, clerk, mechanic—do you remember when you learned to drive a motor car? If among the first in your community, you were a hero. The same opportunity presents itself today in aviation. Don't lag behind the times!

Learn near your home. Pay as you learn and fly. All schools listed here are affiliated with the Porterfield system, well known as schools where you get what you pay for.

You can spend many times the price of Porterfield training on an education along other lines—and, at the finish, you will make more money in aviation. It will take you less time, too, reaching your goal in aviation.

Exclusive Advantages Offered by Porterfield Schools

1—No big initial payment.
2—Pay as you fly only.
3—Low prices.
4—Government licensed planes and pilots.
5—Large, well-kept fields.
6—Personalized training—each student's problems analyzed and solved by experts.

YOUNG WOMEN! Opportunity awaits you in aviation. Today there are more than 110 licensed women pilots in America. A year ago there were 35! Excellent business opportunities are open to young women trained in aviation.

YOUNG MEN! Opportunity awaits you in aviation. You have but to look about you and see those who have already started in the industry. Look at the jobs they now are holding. Why not have one of these for yourself? Don't delay! Write or wire your nearest Porterfield school today!

Write or wire today to your nearest Porterfield school:

In Kansas City it's Porterfield Flying School, Inc.

In Atchinson, Kans., it's Porterfield Flying School, Inc.

In Coffeyville, Kans., it's Coffeyville Airways Corp.

In Texarkana, Ark., it's Texarkana Flying Service.

In Dallas, Tex., it's American Eagle Aircraft Corp. of Texas, Love Field.

In Carthage, Mo., it's Carthage Airways Corp.

Porterfield Aviation Interests, Inc.,
Fairfax Airport,
Kansas City, Kansas.

Your "Pay-As-You-Fly" Aviation School Plan looks good to me. Please send me full details.

Name ....

Address ....

City .... State ....

Porterfield
AVIATION INTERESTS INC.

(*Pennsylvania News continued*)

Lorin C. Faurot, Robert M. Ginter, Robert H. Hancock, George R. Hann, John S. Herron, E. A. Holbrook, Raymond M. Marlier, Casper P. Mayer, C. Bedell Monro, John P. Morris, D. Barr Peat, Maurice R. Scharff, Theodore Taney, Herbert V. Thaden, Robert V. Trader, and Comdr. E. E. Wilson.

THE Eastern Regional Aircraft Show, which had been announced as beginning March 22nd, has been postponed until April 18 to 26 at the suggestion of Aeronautical Chamber of Commerce, which sanctioned it, and will be called the Tri-State Aircraft Show. The exhibition is being planned by directors to make it an annual affair for the states of Pennsylvania, New Jersey, and Delaware.

PHILADELPHIA

[R. GARD]

WITH the beginning of active twenty-four-hour operation recently, Central Airport, Camden, N. J., became a link in the chain of Government operated weather stations maintained for airplane pilots. The addition of a third system to two other weather reporting systems which had been in operation at the Camden field completes the hook-up of the field with the nation-wide chain.

TWENTY-SIX employees of the Keystone Aircraft Corporation at Bristol were present at the first meeting of a newly organized flying club held recently. Officers were elected as follows: T. M. Montgomery, president; H. Koncen, vice president; O. E. Ross, flight manager; and Elliott Cogswell, secretary and treasurer.

The club is planning to purchase a plane for the use of the members. The Keystone company is allowing use of its field, and has promised to give the club every assistance. Edgar N. Gott, president of the Keystone concern, recently became a member of the club.

AT A recent meeting of the Aero Club of Pennsylvania the following officers were elected: W. Lawrence Saunders, 2d, president; J. Wesley Smith, first vice president; Paul Thomas, second vice president; William Shehan, treasurer; Robert E. Lenton, secretary; Graham S. Mason, assistant secretary; and Dr. Thomas E. Eldridge, Conyers B. Graham, D. W. Guy, T. D. Hooper, W. L. LePage, C. T. Ludington, Robert McLean, J. S. Owens, J. B. Parker, Harold F. Pitcairn, D. M. Sheaffer, J. C. Smith, Jr., H. S. Taylor, and E. Burke Wilford, directors.

PITTSBURGH

[R. W. COATES]

THE Pennsylvania Aircraft Operators Association was founded recently in Pittsburgh. Weekly meetings are held in the William Penn Hotel. Memberships throughout the state will be sought by a committee headed by Joe Dawson of the Dawson-Babcock Aircraft Corp.

The purpose of the new organization is to promote the advancement of knowledge in the operation, manufacture, sale and repair of aircraft, airports and accessories. The association will represent a clearing house for operators in which difficulties may be overcome. The majority of operators in this district were represented at the first meeting. Bob Dake was elected president; John Douglas, Jr., vice president; R. V. Trader, manager of the Pittsburgh School of Aviation, secretary and treasurer; R. W. Coates, D. Barr Peat and Jack Thompson, directors.

CARNEGIE TECH'S new Gottingen type wind tunnel will be completed soon. The tunnel is sixty-three feet in length and twenty-two feet wide. It is equipped with a 125-horsepower motor and a three-blade Westinghouse propeller. A four-foot jet will permit testing of models with a wingspread up to 30 inches.

By stepping up the motor it will be possible to produce a 200-mile wind, according to Prof. Allen H. Blaisdell, in charge of aeronautical engineering at the school. From 400 to 1,200 revolutions can be obtained at the propeller. A direct-reading water type velocity gauge, measuring up to 1/10,000 of a pound, will be used in connection with the tunnel. Rib-testing and static testing equipment will be added to this department later.

MARYLAND

[E. W. WALSH]

Maryland's Aviation Record During 1929

NO accidents more serious than a flat tire or a splintered propeller is the record which was established in commercial flying throughout Maryland during the year 1929. According to approximate figures on flying in the state for the year, eight thousand passengers were carried three hundred thousand miles without a major mishap. These figures indicate a substantial increase in flying over the figures for 1928.

For the current year Maryland is better equipped than it was last year for carrying passengers and cargo by air. There are now four operating airports in or near Baltimore, three great fields being now under construction

That more and more persons are taking interest in aviation is indicated by the number of persons taking up aviation. Last year over 150 pilots and over 400 aeronautical students were trained in the training schools of Maryland, most of which are located in Baltimore. Business men are taking up aviation and schools and colleges are adding aviation to their curriculums. The interest being shown in aviation, enhanced by the location of large aircraft manufacturing plants, is certain to make for greater commercial flying in the state during 1930.

THE Curtiss-Wright Flying Service of Baltimore, Md., will inaugurate on March 4th a training course for business men. Working in conjunction with the Baltimore Association of Commerce, Major William D. Tipton, manager of the service, stated that a course had been outlined to familiarize the average business man with the fields of aviation.

WASHINGTON, D. C.

CAPT. TOM CARROLL has joined the engineering staff of the Federal Aviation Corporation of Washington, D. C., as technical advisor. Capt. Carroll will devote his attention to the development of the Washington Airport, for the improvement of which $600,000 has been appropriated by the Federal firm. The Washington Airport is five minutes travel time from the center of the city, at the south end of Highway Bridge.

Capt. Carroll was for nine years manager of the flight research section of the National Advisory Committee for Aeronautics, and was selected to test fly the craft entered in the Daniel Guggenheim Safe Aircraft Competition by the Guggenheim Fund.

THE Szekely S-R-3 aircraft engine was mistakenly reported in the January, 1930 issue of AERO DIGEST to have been issued an Approved Type Certificate by the Department of Commerce. The engine was approved without a certificate.

FLORIDA

[J. WRIGHT]

NO DECISION on a site for the new Tampa Municipal Airport for land and seaplanes was reached at the meeting of the board of aldermen on January 24. A $750,000 bond issue was recently voted for the project. It is quite possible that the funds will be used for an expansion and improvement of the present municipal airport, Drew Field. Complete airport lighting equipment recently installed was put into operation at this airport on January 16th. As a result of this and other recent improvements made at the airport an A1A rating has been applied for.

Should the funds be used for improving the present airport instead of construction of a new one, a seaplane base will be built about a mile and a half from the airport and will be connected with the airport by a direct road to be built.

A REPORT covering the activities in 1929 of the Pan American Airways system was recently issued by officials of the airways company. The system extended its operations last year from Brownsville, Texas, and Miami, Fla., to the Panama Canal and down the west coast of South America to Santiago, Chile, and Buenos Aires, Argentina.

Planes of Pan American Airways flew a total of 2,086,000 miles in 1929, as compared with a total of 149,824 miles flown in 1928, and 11,970 in 1927. In 1929 the company completed 98.94 per cent of its scheduled trips, 91 per cent of these being completed on time. Mechanical difficulties caused the incompletion of .21 per cent of the scheduled trips, and .85 per cent were cancelled because of unfavorable weather.

(*Continued on next page*)

Curtiss-Wright Offers

54 licensed **Used Planes** in air-worthy condition

STUDY this list. Notice the unusual values. Every plane listed is licensed for passenger carrying. Each has been thoroughly inspected . . . and reconditioned when necessary in our own shops. You can purchase any plane on easy payment terms.

For complete information, wire or write at once to the Curtiss-Wright branch shown in the last column, or to Department AD,27 West 57th Street, New York City. Your message will receive immediate attention.

Statement of Policy on

SALE OF USED PLANES

1. Curtiss-Wright accepts in trade only *licensed* aircraft and engines.

2. Curtiss-Wright sells used equipment only when it is *air-worthy.*

3. Curtiss-Wright examines every used plane and used engine—and gives an *accurate* and *complete* report on its condition to the prospective purchaser.

4. Curtiss-Wright issues an inspection certificate with every sale.

Make	Type	Engine	DC No.	Hours	Price	Base
Cessna	4 pl. Cabin	300 Whirlwind	NC-301-M	15	$9,125	Miami
Cessna	4 pl. Cabin	225 Whirlwind	C-9863-M	37	7,815	Memphis
Cessna	4 pl. Cabin	225 Whirlwind	NC-631-K	9	7,955	Columbus
Cessna	4 pl. Cabin	300 Whirlwind	NC-638-K	4	9,180	Dallas
Cessna	4 pl. Cabin	Warner	C-9852	107	3,965	Columbus
Cessna	4 pl. Cabin	Warner	NC-8144	30	4,350	Valley Stream
Cessna	4 pl. Cabin	Warner	C-8784	59	4,205	Los Angeles
Cessna	4 pl. Cabin	Warner	C-8795	94	4,030	Chicago
Cessna	4 pl. Cabin	Warner	C-8792	96	4,020	Oklahoma City
Cessna	4 pl. Cabin	Warner	C-8145	87	4,065	Raleigh
Cessna	4 pl. Cabin	Warner	NC-8148	60	4,200	Boston
Cessna	4 pl. Cabin	Warner	C-8791	25	4,375	Miami
Curtiss Robin	3 pl. Cabin	OX-5	NC-251-E	321	1,737	Rockland
Curtiss Robin	3 pl. Cabin	OX-5	C-288-E	54	2,538	Chicago
Curtiss Robin	3 pl. Cabin	OX-5	C-264-E	102	2,394	Chicago
Curtiss Robin	3 pl. Cabin	OX-5	C-361-E	50	2,550	Denver
Curtiss Robin	3 pl. Cabin	OX-5	NC-171-E	58	2,526	Louisville
Curtiss Robin	3 pl. Cabin	OX-5	NC-297-E	99	2,403	Louisville
Curtiss Robin	3 pl. Cabin	OX-5	NC-108-E	75	2,475	Roosevelt Field
Curtiss Robin	3 pl. Cabin	OX-5	NC-228-E	85	2,445	Roosevelt Field
Curtiss Robin	3 pl. Cabin	OX-5	C-9209	93	2,421	Raleigh
Curtiss Robin	3 pl. Cabin	OX-5	C-177-E	109	2,373	Miami
Curtiss Robin	3 pl. Cabin	OX-5	NC-157-E	147	2,259	Houston
Curtiss Robin	3 pl. Cabin	OX-5	NC-319-E	192	2,124	Indianapolis
Curtiss Robin	3 pl. Cabin	Millerized OX	NC-8340	165	2,505	Caldwell
Curtiss Robin	3 pl. Cabin	Scintilla OX	C-8347	165	2,205	Baltimore
Curtiss Robin	3 pl. Cabin	OX-5	NC-7751	76	2,472	Buffalo
Waco	3 pl. Open Bi	OX-5	NC-9506	70	1,750	Louisville
Waco	3 pl. Open Bi	OX-5	C-921	82	1,750	Memphis
Waco	3 pl. Open Bi	OX-5	NC-5183	80	1,750	Camden
Travelaire	3 pl. Open Bi	Hisso	C-6149	128	2,600	Baltimore
Travelaire	3 pl. Open Bi	OXX-6	NC-6012	140	1,800	Hartford
Travelaire	3 pl. Open Bi	OX-5	NC-1142	200	1,200	Bridgeport
Travelaire	3 pl. Open Bi	Hisso	NC-6037	108	2,600	Louisville
Travelaire	3 pl. Open Bi	Millerized OX	NC-4851	314	1,750	Moline
Travelaire	3 pl. Open Bi	OX-5	NC-4427		1,800	Boston
Monocoupe	2 pl. Cabin	Velie	5725	23	1,200	Louisville
Sparton	3 pl. Open Bi	Siemans	NC-6577	140	1,750	Detroit
Stinson	4 pl. Cabin Bi	Wright J-5	NC-2779	400	4,000	Hartford
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-5458	32	4,000	Portland
Fairchild	Photo Mono	Challenger	NC-32	652	3,000	Bridgeport
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-4440	328	3,900	Louisville
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3569	206	3,500	Valley Stream
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3315	108 (Eng.)	4,000	Boston
Fairchild	Photo Mono	Challenger	NC-4755	108	3,800	Valley Stream
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3569	9 (overhauled)	4,000	Pittsburgh
Command Aire	3 pl. Open Bi	OX-5	M-931	87	1,965	Portland
Command Aire	3 pl. Open Bi	OX-5	NC-480-E	118	1,810	Baltimore
Command Aire	3 pl. Open Bi	OX-5	NC-584-E	5	2,375	Bridgeport
Command Aire	3 pl. Open Bi	OX-5	NC-582-E	342	1,200	Miami
Ireland	Amphibian	300 Whirlwind	NC-109-H	102	17,090	Rockland
Ireland	Amphibian	400 Wasp	NC-90-K	120	21,000	Roosevelt Field
Ireland	Amphibian	300 Whirlwind	NC-111-H	40	17,400	Roosevelt Field
Swallow	3 pl. Open	OX-5		150	1,750	N. Y. Office

CURTISS-WRIGHT FLYING SERVICE

DIVISION OF CURTISS-WRIGHT CORPORATION

"World's Oldest Flying Organization"

(Florida News continued)

WARD T. VAN ORMAN has been put in charge of ground school work and free balloon classes conducted by the Goodyear Zeppelin Corporation at its airship dock in Miami, Fla. Mr. Van Orman was the winner of the 1929 James Gordon Bennett International Balloon Race.

THE greater Miami Airport Association has indorsed the proposed National Park at Cape Sable, Florida, which will be inspected by an official party led by Secretary of the Interior, Dr. Ray Lyman Wilbur. The resolution was introduced by J. E. Yonge, chairman of the municipal aviation board. A. H. Heermance, director of aviation for the city of Miami announced that a seaplane base would be built.

ALABAMA

[O. G. JONES]

THE Alabama Department of Agriculture has announced a plan of using planes in making soil survey maps of the various counties in the state. Seth P. Storrs, state commissioner of agriculture, declares that a tremendous saving in both money and time will be netted by this move.

The plan will be to have aerial photographers make a base map of each county, which will then be used in the making of the soil survey map. The aerial photographer can make this base map in one-third the time required by ground methods and at an estimated saving of $5,000 for each county. The aerial photographs, it has been found, give a very accurate base map for the purpose.

BEGINNING the fifteenth of February, passenger service is available to the public between Birmingham and Atlanta. The Davis Airlines, Inc., of Atlanta, headed by Doug Davis, was organized recently to operate the line. Johnny Gill is traffic manager and L. J. Sauerborn, business manager of the organization.

Daily service is maintained between the two cities, with a plane leaving each city each morning and afternoon. This will make it possible to reach Atlanta from Birmingham by four in the afternoon. A stop is made at Anniston, Ala.

THE Solar Aviation Company of Mobile was recently organized to do a general line of commercial aeronautic work. Incorporators are E. E. Masser, Henry McCarty, E. W. Lingfelter, and L. M. Lingfelter. Headquarters will be maintained at Bates Field, Mobile.

Mobile is planning on enlarging and improving Bates Field, one of the first large municipal fields in the state. The engineering department of the city is laying plans for the new improvements. There is an adjoining plot of land that belongs to the city which will be leveled and filled in, thus making the field larger. Approximately $40,000 will be spent on the airport, which was named after Cecil Bates, present mayor of Mobile.

LOUISIANA

[C. F. COOK]

RESULTS of reduced passenger fares on the air service operated by Delta Air Service, Inc., from Birmingham, Ala., through Jackson, Miss., Monroe and Shreveport, La., to Dallas, Texas, have been very satisfactory, according to announcement of airline officials. The reduced rates were effective January 20, and placed the airplane fares practically on a par with railroad Pullman fares. Schedules of the airline were altered to fit in with railroad schedules.

THE city council of Shreveport recently voted to establish the local municipal airport on the Free State Plantation, a tract of nearly 350 acres in Agurs, and within a reasonable distance of the city. The tract will cost $152,000, the cost to be paid out of the $300,000 municipal airport bond issue. The remainder of the fund will be used for equipment.

TENNESSEE

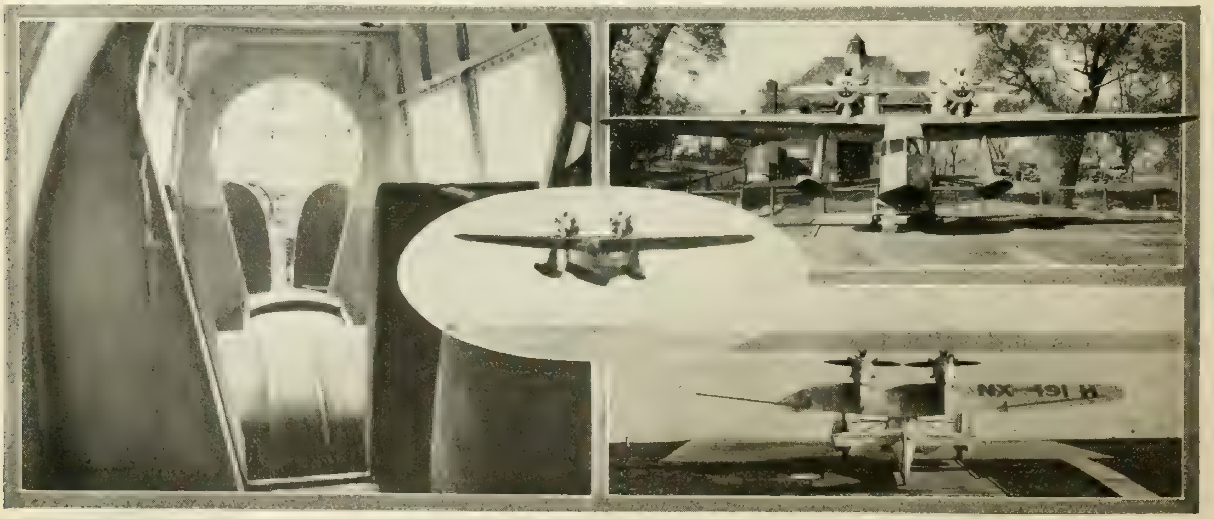
THE first meeting of the Mid-South Aeronautic Association will be held at Memphis, Tenn., March 27-28, according to a recent announcement of officials of the association. The Mid-South Aeronautic Association was formed recently for the purpose of organizing as a single unit the organizations working for the development of aviation in the Central South. The association is sponsored by the Memphis Chamber of Commerce, and the first convention will be held to effect a permanent organization and to outline a program of activities. Major Robert Haverty has been appointed temporary president of the association.

The principal objects of the Mid-South association are the development of airports and emergency landing fields, encouragement of additional air mail lines, establishment of passenger and express air transport services, and the encouragement of the establishment of aircraft manufacturing factories in the South.

Leaders in the aviation industry in Arkansas, Mississippi, Tennessee, Missouri, Louisiana, Kentucky and Alabama have been invited to attend the meeting of the association, in addition to the governors of these states and other public officials.

ARMSTRONG FIELD, Memphis, Tenn., is comprised of 203-acres of leveled and graded land with facilities for the housing, repair and servicing of airplanes. An administration building and hangars have been constructed at the field by the Standard Oil Company at a cost of $75,000 in return for an exclusive franchise to sell oils and gasoline at the airport.

The movement to establish a modern airport at Memphis was started in 1924 by the Memphis Aero Club, which instigated a campaign to secure the coöperation of the Mayor and other city officials in the establishment and maintenance of a municipal field. As a result, a committee was selected by the city officials to make a survey of possible sites for the airport.



Views of the Towle T-2 amphibion developed by the Towle Aircraft Company of Detroit, Mich. It is of full cantilever construction using a new type of internal wing trussing, and is powered by two Wright Whirlwind Five engines

FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

ENGLAND

THE annual financial report of the De Havilland Aircraft Co., Ltd., of Great Britain, for the year ending September 30, 1929, was recently made public by officials of the company. The report contained a comparison of finances at the end of this period with the corresponding period in 1928.

The net profit of the De Havilland company after expenses, interest charges, taxes and dividends had been deducted was $292,434, as compared with $132,143 in 1928. Net income and dividends for 1929 were $237,021 and $158,673 respectively. The total assets of the company including land, buildings, machinery, investment in affiliated companies and current assets were $2,636,189 at the end of the period in 1929. The net working capital at the end of the 1929 period totaled $1,210,037, as compared with $376,901 for the year ending September 30, 1928.

INCLUDED in the activities for 1930 of National Flying Services, Ltd., of London, will be the establishment of flying fields at Nottingham and Stoke-on-Trent and additions to the fleet of aircraft operated by the company in aerial taxi services and student flying. Delivery of six new two-place Desoutter air taxis has been made and the company will order thirty-nine additional planes of this type during 1930. The company recently ordered twenty-five Blackburn Bluebird two-place light airplanes manufactured by Saunders Roe at Cowles.

A new flying club, the South Staffordshire Aero Club, will be established at the flying field at Stoke-on-Trent, and will be the sixth club operated by the National Flying Services, Ltd.

FRANCE

A WORLD'S endurance record of eighteen hours, one minute and twenty seconds with a load of 1,000 kilograms (2,200 pounds) and a distance record of 3,275 kilometers (2,047 miles) with the same load was established by Capt. Dieudonne Coste and Lieut. Paul Codos in a flight which terminated at Istres, France, on Feb. 16. The pilots established the records over a triangular course from Istres to Nimes to Narbonne to Istres, and were finally forced down by a severe rainstorm.

Capt. Coste and Lieut. Codos used the plane, *Interrogation Point,* which established the world's distance record in 1929 in a flight from Paris to China. The former endurance record of fourteen hours, twenty-three minutes and forty-five seconds was established in Germany by Fritz Horn on April 4, 1927, and the former distance record of 2,515 kilometers with 1,000 kilograms of load was set by Herman Steindorff in a flight in Germany on July 31, 1927.

THE merger of several large companies in the French aeronautical industry to be known as the Societe Generale Aeronautique and to be capitalized at 400,000,000 francs (approximately $16,000,000) was announced recently. The following companies will be involved in the merger: Argenteuil division of the Lorraine-Dietrich Company, manufacturer of automobiles and airplane engines; Hanriot Company, manufacturer of training planes; Societe d'Emboutiage et Construction Metallique, makers of all-metal planes; Chantiers Aero-Maritimes de la Seine, manufacturing seaplanes, and the Nieuport-Astra, constructors of pursuit and racing planes.

GERMANY

[E. P. A. Heinze]

THE managers of the Deutsche Luft Hansa, the largest German airline operator, invite representatives of the press to discussion dinners every few weeks for the purpose of securing the coöperation and education of German newspapers. One of the officers of the company generally gives a short talk on the work and problems of the company, and then a discussion takes place and questions put forward by members of the press are answered. The German press keenly follows up air transport developments. These discussion evenings greatly help to clear up misunderstandings and constitute an education for reporters.

In this way the Luft Hansa gets in close touch with the newspapermen and establishes a friendly relationship with the press. The company sends confidential reports of any accidents to the reporters giving the findings of independent experts, who have carefully examined the causes of such accidents. The members of the press thus learn the problems and viewpoint of the company and know that everything humanly possible is being done to prevent such occurrences. This coöperation and understanding results in the press remaining comparatively calm whenever an accident occurs and voicing a cool judgment of the occurrence.

King Albert of Belguim and Italian Minister of Air Balboa reviewing airplanes at the Rome airport during the recent royal wedding

THE German Reichstag has demanded that the number of aircraft makers in Germany supported by subventions be reduced. The Government is carrying through a savings program which does not admit of further subsidies being granted, except to a very few selected makers of good transport planes. The German minister of transportation has selected the makers that are to be supported by the government. He has chosen Junkers, Dornier, Bayerische Flugzeug-Werke and Heinkel among plane makers and Siemens, Bayerische Motoren-Werke and Junkers of the engine makers. The Luft Hansa may purchase only from these firms.

Last fall all German makers of transport planes were paid a sum of nine million marks which was distributed between them to induce the makers that were not selected for future support to reorganize their production and take up other manufacturing lines, or to effect such changes in their production as would enable them to compete on the open international market in such a manner that they could support themselves. The selected companies are to receive between five and six million marks in Government grants, but even with these they will have difficulty in maintaining their factories because the largest German purchaser, the Luft Hansa, has worked out a reduced budget and, having a good stock of machines and material in hand, will not make any notable purchases this year. The few small airline operators, which will be free to purchase machines of the makers not selected, have no great requirements.

ITALY

NEW world's records for distance and duration for tourist planes over a closed circuit were established on January 20 by Renato Donati who flew for twenty-nine hours, three minutes and nine seconds over a course between Ladispolis, Ostia and Anzio, Italy, covering an estimated distance of 2,800 kilometers (about 1,740 miles). He flew a Fiat AS I powered with an 85-horsepower Fiat engine and carried with him as a passenger Lieut. Capannini. Donati took off from Montecelio Field on January 19

(*Continued on next page*)

Views of the erupting Santa Maria volcano in Guatemala taken during an aerial survey of the eruption

(Continued form preceding page)

and landed the following day at the flying field at Centocelle. The previous record of 1,200 kilometers was held by the German pilot Cornelius.

AUSTRALIA

A SYSTEM of illumination has been installed on the route from Perth to Adelaide, Australia, over which mail and passenger planes are operated. The cost of the lighting equipment and its installation is estimated at $85,000. The illumination begins at Maylands Airport, near Perth, and extends to Cook, a distance of 913 miles.

Floodlights have been placed at the airports and landing fields on the route and floodlight system covers an approximate area of one-half a square mile. The buildings at each field are illuminated by means of reflectors and half-watt lamps. Illumination of the grounds is obtained by means of floodlights of sixty million candlepower.

Situated along the route at regular intervals are revolving beacons of 3,000,000 candlepower visible at a distance of fifty miles under favorable weather conditions.

EXTENSIONS on the airlines operated by Australian Aerial Services, Ltd., were recently announced by officials of the company. The new routes are as follows: Melbourne to Adelaide, via the intermediate western district and cities in South Australia; Port Augusta to Mildura and Cootamundra to Sydney, connecting with the Adelaide to Cootamundra bi-weekly services at Mildura and Cottamundra; Cootamundra to Charleville and Camooweal to Daily Waters, operated on a schedule which will enable passengers leaving Melbourne, Adelaide and Sydney to reach Darwin within five days; Murray Valley aerial service, operated along the Murray River from a western terminal to be selected east to Cootamundra, via Echuca and Albury and serving as a feeder line to existing services; Broken Hill to Bourke along the Darling River, via Wilcinnia, which will enable passengers from Adelaide to reach Brisbane, via Broken Hill and Bourke, within three days.

Surveying the Santa Maria Volcano in Guatemala

[H. C. PLUMMER]

A flight over an erupting volcano in Guatemala in search of survivors and to make observations and photographs was completed recently by Arturo Aguirre, Director General of Aeronautics of Guatemala, and Pilot Dorrell of the Pickwick Latin-American Airways. The eruption of the volcano, Santa Maria, caused the death of many persons and the destruction of thousands of dollars' worth of valuable cultivated land.

The territory in the vicinity of Santa Maria, extending over an area of several miles and composed for the most part of coffee groves and fruit orchards, was laid waste and submerged by a flow of lava which spread over the level areas into the Tambor and Nima Rivers. Flying over this territory, Aguirre and Dorrell saw ranch buildings and acres of coffee devastated. They searched the ground from an altitude as low as poisonous gases and vapor would permit, but no survivors were seen. Observations and photographs were made at less than fifty yards above the crater of the volcano.

The flight was undertaken and carried out under extremely difficult and dangerous conditions. The volcano is located on one of an unbroken series of high mountain peaks that form the vertebrae of the North American Continent as it tapers southward to the Isthmus of Panama. In the flight from Guatemala City to the volcanic area, territory comprised of high mountain ranges, rivers, forests and remote territory was flown over.

Director Augirre rendered a report of the survey upon his return to the capital and photographs obtained together with the report were turned over to the government.

CANADA

[J. MONTAGNES]

WESTERN Canada Airways, Limited, recently purchased several Boeing combined mail-passenger planes for use on the Winnipeg-Banff air mail service. Three of the planes, required for immediate delivery, will be supplied by the Boeing factory in Seattle, while the others will be built at the Vancouver factory. The plane selected has a cabin for four passengers and mail.

A CLAUDE NEON aviation beacon has been installed above the roof of the Hudson Bay Store at Winnipeg, Canada, according to a recent announcement of P. J. Parker, general manager of the Hudson Bay Company. The beacon has been erected at a height of 200 feet on a tower sixty feet above the roof of the building, and will be visible for a distance of over one hundred miles.

THE annual meeting of the Toronto Flying Club was held on January 27, at Toronto, Canada, for the purpose of electing officers for 1930 and reviewing the activities of the club during 1929. The total number of hours flown by the club at the end of 1929, according to the report of Capt. E. M. Hand, president of the club, was 1,500, in which time twenty-eight members received pilots' licenses and forty additional members qualified for solo flying.

In 1929 the Toronto Flying Club continued flying through the winter months and planes were equipped with skis for landings and take-offs on snow and ice. During the summer, a clubhouse for the use of members was constructed at Leaside. Included in the flying activities in which members of the club participated during the year was a flight in April from Toronto to Selfridge Field, Michigan, in which twelve planes took part; participation in flying exhibitions and races at the National Air Races at Cleveland in September; the sponsoring of the National Air Tour stop at Toronto in October as guests of the club; and the participation of six planes of the club at the dedicatory ceremonies of the airport at Kitchenor which were held in November.

The officers of the Toronto Flying Club elected for 1930 are as follows: Capt. E. M Hand, president; James G. Crang, vice president; Harold G. Burley, secretary; H. D. MacKeen, treasurer; and Dr. Fletcher Sharp, G. Norman Irwin, J. D. A. McDonald, C. E. French, and Arthur Flack, directors.

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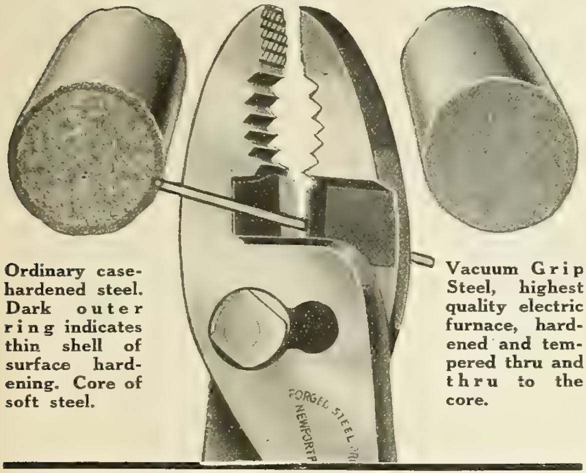
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Vacuum Grip Steel, highest quality electric furnace, hardened and tempered thru and thru to the core.
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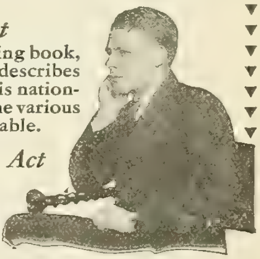

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MEXICO

[M. HURST]

THE first factory for the manufacture of airplanes in Mexico was inaugurated recently at Balbuena Field, Mexico City. Organizers of the firm, Juan P. Azcarate & Co., are Gen. Azcarate, head of the Government's aeronautical bureau of the war department, and Gen. Abelardo L. Rodriguez. Complete machinery for the manufacture of all parts of planes except the engines has been installed in the new factory. Engines will for the present be imported from the United States. Later an engine factory will also be added to the plant of the company.

IT has been announced that in the future no military pilot of Mexico will be permitted to leave the ground without a parachute. A supply of parachutes has been purchased in the United States and distributed among the military fliers. Heretofore the flying corps has not been equipped with this safety equipment.

CONSTRUCTION of the two large hangars at the Brownsville, Texas, airport has been completed by the Cia. Mexicana de Aviacion. These hangars have a capacity of four Ford trimotored planes each. They are equipped with air compressors and general shop fixtures in order that repair work may be done without the inconveniences of moving planes into the shops. Work started on the hangars in October.

ANNOUNCEMENT has been made of a nine-hour passenger service to be inaugurated between San Antonio, Texas, and Mexico City in the operation of the new line from San Antonio to Torreon by the Transportes Aereos Transcontinentals. Connections will be made at Torreon with the Juarez-Mexico City service of the Corporacion Aeronautica de Transportes.

THE issuance of cards to commercial travelers entitling holders to a twenty-five per cent reduction in regular one-way fare, was recently announced by the Corporacion Aeronautica de Transportes of Mexico. Each card contains provision for the photograph and signature of the holder, and all ticket agents of the company have been instructed to allow the reduction in fare on presentation of the card at the time the ticket is sold.

COLONEL ROBERTO FIERRO, well-known Mexican flier, who last year made good-will tours of the United States and Latin-America, has been named Mexican Director of Civil Aeronautics in the Department of Communications. Colonel Fierro fills the post formerly held by Guillermo Villasena.

URUGUAY

THE Uruguayan Public Health Department is formulating plans for a project to organize an up-to-date hospital service throughout Uruguay. Large ambulance-planes will be used in the public health work, according to a Departmental announcement. Uruguay will be the first country to establish such a service in Latin-America.

BRAZIL

THE Minister of Communications of Brazil has given permission for the *Graf Zeppelin* to fly over the territory of Brazil on its projected spring flight to South America and to land at Natal and Rio de Janeiro. At the same time permit was given the representatives of Dr. Eckener in Brazil to establish communications with the Hamburg, Germany, airport through the use of the radio-telegraph station operated by the Zeppelin interests in Brazil for the purpose of obtaining metereological data of use on the flight. The Brazilian Minister of War has ordered 300 soldiers from the army air corps to be prepared for the landing of the dirigible at Rio de Janeiro. Authorities of Rio Grande do Sul are also preparing for the landing at Natal.

BOLIVIA

THE Bolivian Aviation Department, through the Bolivian Minister at Paris, recently ordered the shipment of a new Junkers transport plane for the Lloyd Aero Boliviano. The Junkers will deliver the plane to the Bolivian pilots, Vazquez and Luizaga, to be shipped to Bolivia via Brazil.

The Lloyd Aero Boliviano operates a network of airlines covering Bolivia to the Argentine, Chilean, Brazilian and Peruvian frontiers. Nine scheduled airlines with a total of 2,198 miles are maintained, using German Junkers and Dutch Fokker planes.

PERU

[H. GOMEZ-CORNEJO]

W. O. RUNCIE, chief aerial photographer of the Cia. Aérea de Fotografía y Agrimensura (CADFA) of Peru is to undertake a series of aerial photographic test flights for survey purposes in the Peruvian mountains of the Amazon region. The Peruvian Government's naval airline from San Ramon to Iquitos will provide the airplane and personnel for the survey work which is being undertaken for the Peruvian Government.

The Peruvian aviation authorities have for some time been preparing surveys for new airlines into the Peruvian Amazon region. Last November a Peruvian Naval airplane made the first flight to Yurimaguas, Department of San Martin, from Tierra Blanca, on the main air route from San Ramon to Iquitos. This experimental flight has now opened that region with a regular weekly air service for air mail and passengers, thus connecting Lima with Yurimaguas, via railroad, car and airplane within forty-eight hours.

The line from Mischagua, to Maldonado on the River Madre de Dios, will be put into service as soon as airplanes newly ordered from the United States arrive. The service will connect the distant Madre de Dios Department with Lima, the capital, by a combined three-day transport service.

The nearest air approach to Maldonado is from southern Peru, from Puno, Cuzco and Arequipa, the first two named being situated five flying hours and the latter about seven hours away. There is a project to join Maldonado with Puno, using an air base on Lake Titicaca, and to extend the air service from Lima to Arequipa and Puno, in combination with a project of joining airlines of the Lloyd Aero Boliviano. National and international airlines stop at Arequipa.

HAROLD GOMEZ-CORNEJO, a Peruvian airman, is planning to establish the first Peruvian Flying Club. Mr. Gomez-Cornejo in 1929 organized and prepared all the necessary details for the formation of a club but withdrew them in favor of a co-operative plan submitted with the support of an American aircraft manufacturer. These plans were approved and officially recognized on November 25, 1929, by the Peruvian government. Since that time no action has been taken by the American firm.

Over three hundred young Peruvian men and women have registered their names as prospective candidates to the club. Mr. Gomez-Cornejo was a war-time pilot with the British Air Forces from 1915-19, and a commercial air pilot in Europe till 1927.

ECUADOR

FOUR airplanes belonging to the Ecuatorian army air service recently left the Guayaquil airport, El Bosque, piloted by Capt. Renela, Lieut. Borja, Capt. Mantilla and Capt. Velez en route to Quito, the capitol. Two of the planes were Travel Air monoplanes, fitted with 220-horsepower Wright Whirlwind engines, newly arrived from the United States. The planes flew directly to Illinaza mountain, where the Cordillera range was crossed. The airplanes arrived after five hours and thirty minutes elapsed time at the Quito airport, Inaquito, where the president of the republic, his ministers of state and the inspector general of the army welcomed the airmen after their flight. This is the first time in the history of the Ecuatorian army air service that Ecuatorian airmen have flown directly from Guayaquil, on the coast, to Quito. Capt. Harold Harris last October flew from Guayaquil to Quito in a Fairchild cabin airplane in the record time of two hours and forty-five minutes.

ARGENTINA

TWO flights across the Andes Mountains from Santiago, Chile, to Buenos Aires, Argentina, were recently completed by William Hillcoat, pilot of the Curtiss-Wright Export Corporation in Argentina. The flights were made in a Curtiss Challenger Robin and a Curtiss Challenger Fledging which were delivered to the Argentine Government.

The flights included a stretch of 120 miles from Santiago to Mendoza, which both planes covered in about two hours, being required to fly during most of the journey on this leg of the flight at an altitude of 14,000 feet. Both ships were regular stock models without special equipment for flying in high altitudes. The distance from Santiago to Buenos Aires is approximately 800 miles.

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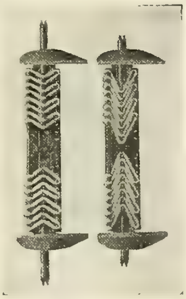

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AE 200-50 2" Belt with rayon applique in colors, Also in plain gray drab

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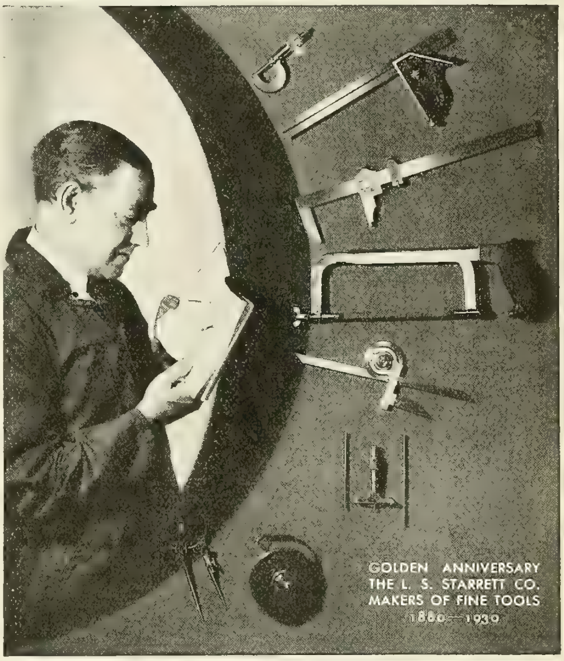

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THE CHUPP "LITTLE BITTY"

SEVEN-FOOT SPAN TRACTOR WITH A GASOLINE ENGINE

IN PAST issues we have studied and built a rather wide variety of aircraft types, ranging from paper gliders to boomerangs and autogiros. We have made an earnest effort to carry out our plan to make each issue a working lesson and at the same time to have lots of fun as we worked out our problems together. This month, through the courtesy of Mr. Carl B. Chupp, factory manager of the Pitcairn Aircraft Corporation of Willow Grove, Penna., we have a real treat de luxe for our section.

"Little Bitty" is a seven-foot span tractor biplane with a real honest-to-goodness two-cylinder gasoline engine. We all cannot build such a model, but surely we all want to know about it. Mr. Chupp, an old friend, is one of those natural born experimenters. Not only has he produced a beautiful model which actually rises from the ground and flies under its own power, but he has also made the engine. Piece by piece this unusual plane and engine were fabricated into an assembly which probably has never been equalled in scientific accuracy and precision.

Because of the great skill and tremendous detail involved in building such models, aviation history has few on record. The first to fly successfully in free flight under its own power using a gasoline engine is the historic tandem monoplane of the late Professor Samuel Pierpont Langley of the Smithsonian Institution. This great pioneer, who was deprived of the distinction of having produced the first successful man-carrying, heavier-than-air machine, by a turn of fate, conducted many experiments with steam and gasoline driven model planes in order to prove that mechanical flight was possible. The last model Langley built before the man-carrying machine was a tandem monoplane with pronounced dihedral on both planes and a large cross type stabilizer. This model had 66 square feet of wing surface, weighed 58 pounds, and developed two and a half to three horsepower. Twin propellers were placed between the planes. A public flight demonstration was given August 8, 1903, by launching the model from a houseboat roof over the Potomac River about forty miles below Washington. This is historically recorded as the first successful public flight of a mechanically sustained flying machine. Previously, as early as May 6, 1896, Dr. Langley had demonstrated the feasibility of mechanical flight, using steam as power; but those trials were conducted privately.

Another gasoline engine model, which has become quite well known is the Stranger tractor biplane, built in England in 1907 by Mr. M. D. Stranger. This model made many successful flights. The four-cylinder engine weighed about five and a half pounds and developed one and a quarter horsepower at 1,300 r.p.m. of the three-foot diameter propeller. This model would take off under its own power at a speed of about 16 miles per hour.

But let's turn again to the Little Bitty, affectionately so named by its builder because his little daughter called it the "little bitty" airplane. It is neither necessary nor advisable to describe every detail of this model, for builders of such machines invariably have such resourcefulness at their command that they will not follow another's footsteps exactly under any conditions. However, a description should be interesting.

The Wings

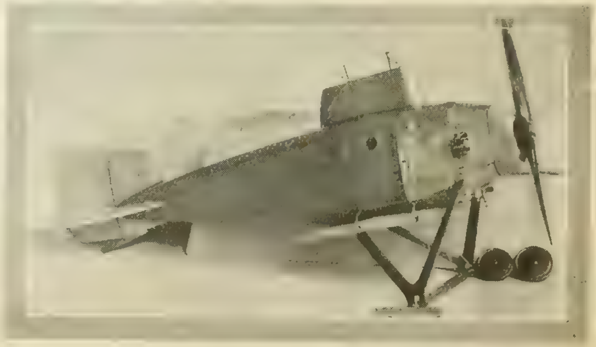
The model is a tractor biplane, as mentioned before, and has a three degree dihedral in both upper and lower planes, in order to provide a high degree of inherent (natural) lateral stability. The angle of incidence, or angle of attack as it is sometimes called, for the upper plane is three degrees and only one for the lower. This gives us a condition known as decalage. Most large, full-size biplanes have decalage. There are many things entering into a design of a plane which a designer considers when using decalage, but the aim in most cases is better stability of the whole airplane.

Hinged portions or ailerons are provided at the tips of the upper plane. These are controllable from the fuselage and are used to correct any tendency of the model to fly with one wing (left or right) low.

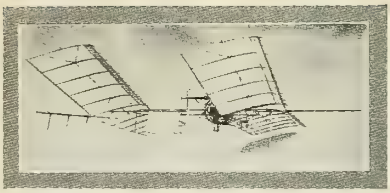
The wing section used is known as the RAF-15, being so named because it was developed by the Royal Aircraft Factory of England. The designation 15 simply identifies this particular curve from countless others developed by the R. A. F. In slightly modified forms this curve has been used on many planes where a thin, externally braced wing was possible in the general design. The Thomas-Morse MB-3, and the original Vought U employed this section because of its fine characteristics.

Here is an excellent opportunity to learn about wing section characteristics. Maybe

Mr. Chupp with his powered model


The Little Bitty with wings removed

that sounds perplexing, but let's just figure it out. (See chart on p. 212.) Those strange looking curves are called graphs because they show graphically or by a drawing just what it would take columns of figures to explain. Of course, the great advantage of a graph is that one can see at a glance the whole story. For example, if we take a rubber band three inches long, and stretch it to four inches, we can weigh the tension or pull by a small spring scale. We'll say it's two ounces. Now we stretch it to five inches and it pulls, we'll say, four ounces. Now we stretch it to six inches, and it pulls six and a half ounces, and at seven inches, ten ounces. Here are all the facts but can you picture them? Probably not, but if you take a sheet of paper and make a graph, it will tell the story. It's simple, too. Just lay out the paper in convenient squares and let each horizontal equal one inch of stretch. Now, if each vertical square equals once ounce, we can spot our points and then draw our curve. There is our picture.

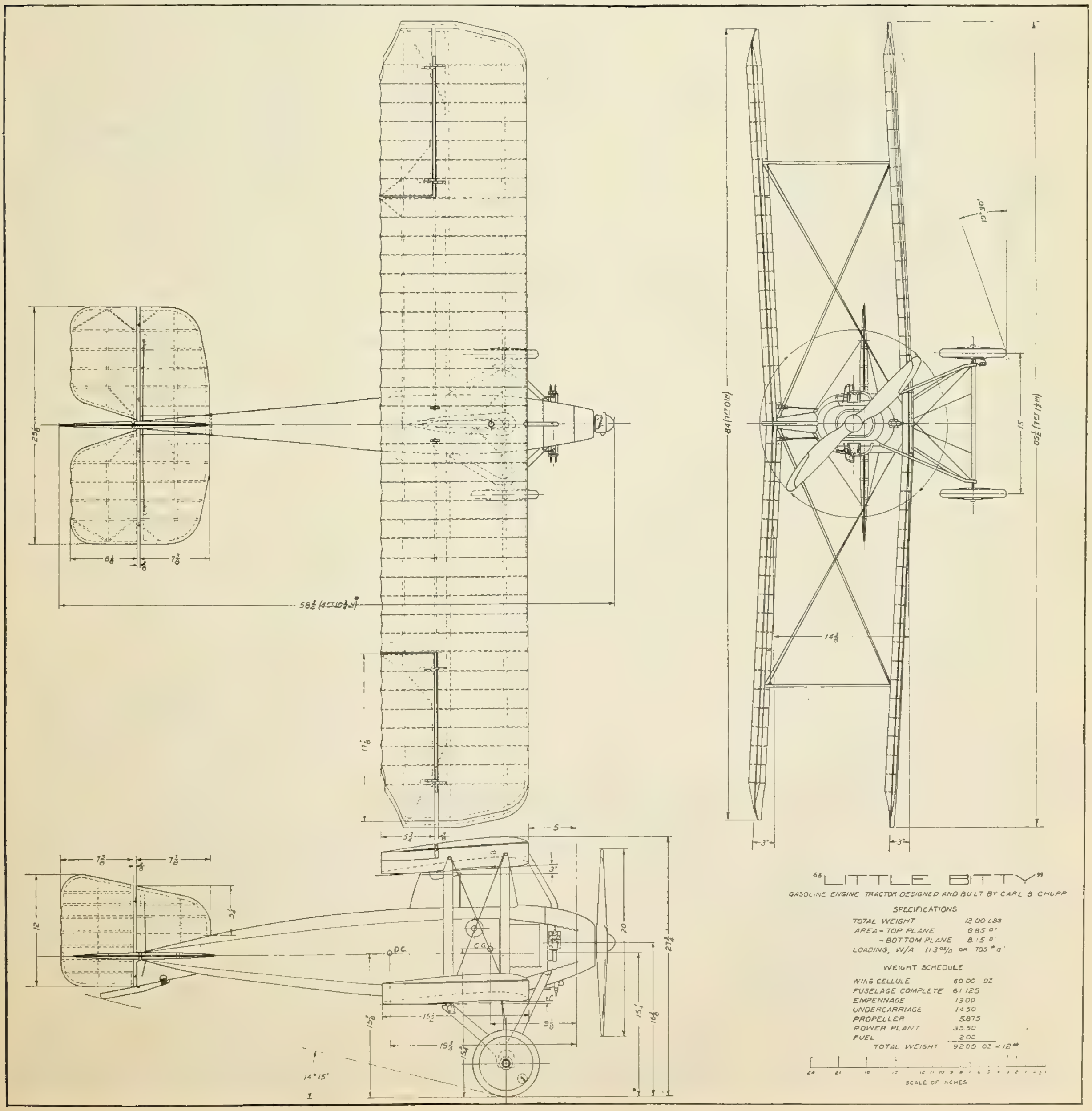


Langley's model with gasoline engine

Let us now turn to our characteristic curves for the RAF-15. In the upper right is the shape of the curve we are studying. In the upper left are the dimensions enabling us to draw this curve to any desired size. The performance characteristics are shown by the three curves below. One is marked *CL,* which means coefficient of lift; another is marked *CD,* meaning coefficient of drag, or resistance; and the third gives us the ratio of lift to drag or lift divided by drag. Of course, the greatest lift for the least drag or resistance gives us the most efficient wing curve. But, all these values change with the different angles of flight which are indicated on the bottom of our chart.

Let's examine the *CL* or lift curve. We see that the lift increases up to an angle of fifteen degrees and then becomes less. That is the stalling or burble point. If we look for the point of lowest drag on the *CD* curve we find it at zero degrees. Notice also that there is lift even though the angle of flight is *less* than zero degrees. Now for

(*Continued on next page*)



"LITTLE BITTY"

GASOLINE ENGINE TRACTOR DESIGNED AND BUILT BY CARL B CHUPP

SPECIFICATIONS

TOTAL WEIGHT	12.00 LBS
AREA - TOP PLANE	8.85 □'
- BOTTOM PLANE	8.15 □'
LOADING, W/A	11.3 oz/□ OR .705 #□'

WEIGHT SCHEDULE

WING CELLULE	60.00 OZ
FUSELAGE COMPLETE	61.125
EMPENNAGE	13.00
UNDERCARRIAGE	14.50
PROPELLER	5.875
POWER PLANT	35.50
FUEL	2.00
TOTAL WEIGHT	192.00 OZ = 12#

(Continued from preceding page)

grees gives us the greatest value and that for higher angles this value falls off rapidly. There we have the whole story all before us, and if we wished to compute actual values we would soon find ourselves involved in the very problems of the airplane designer. However, it seems quite enough at this stage of our study to understand the general idea of performance characteristics without going further.

To return to the description of the Little Bitty wings, we find the assembly quite conventional in that double I section spars are provided to support the lightened out ribs of spruce. Internal bracing of cross wires takes the drag loads just as in a full size plane. Interplane struts and stranded cable complete the wing cellule.

Tail Group

The empennage is of standard design, and both the rudder and the elevators are adjustable to permit control of direction and elevation, respectively.

Fuselage

Semi-monoque construction, similar to the Lockhead Vega, is used in the fuselage. Bulkheads of plywood and formers are all assembled with light longerons and the 1/32 veneer shell is applied over this framework. The lower part of the fin is built into the fuselage, providing a simple support for the tail skid, which is sprung with 1/16 diameter rubber.

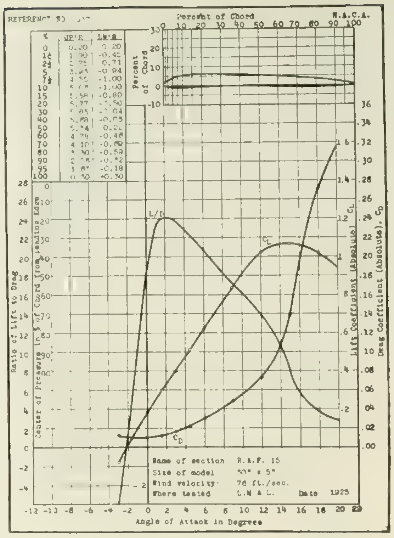
The Landing Gear

Two main Vees of plywood, nicely streamlined, form the main supports for the through axle. Rubber strand 1/16 diameter is used to spring the axle in place. Two seven-inch diameter solid wood wheels with rubber tires are provided. After several trial flights, Mr. Chupp added the skids shown in the photograph in order to protect the propeller in bad landings. In addition to this, a leather disc universal coupling was provided in the propeller shaft assembly. The wide tread of 15 inches gives the model good ground stability.

The Power Plant

The Chupp two-cylinder horizontal opposed engine is such an unusual piece of design and construction that a detailed description will be given in the next issue. Moreover, it may be installed in any flying model weighing about the same amount as the Little Bitty.

Flying



Graph showing the ordinates and characteristics of the RAF-15 wing curve which is used for the Chupp Little Bitty

It has been my privilege to witness some of the flights of the Little Bitty over Cornell University campus at Ithaca, N. Y. After starting the engine by using a large storage battery for ignition, and craking the 20-inch diameter Hamilton propeller, the ignition is switched over to the smaller battery carried in the fuselage. The tail is held as the motor revs up just like a large plane. When all is well the tail is released and the model fairly races down the field tail up. For a few seconds it is possible to keep abreast with it by running and thereby direct its course by guiding the wing tips, but soon she outdistances all the sprinters and takes the air. Ground space has always been limited wherever Little Bitty has been flown: consequently, the automatic ignition cut out has been set to limit the flight to the size of the field.

On block tests the little engine has run for a period as long as twenty minutes without refueling, and at the regular flight velocity this would mean the model would probably be lost.

Perhaps some day Mr. Chupp may be prevailed upon to try for a new world's record for mechanical models. There is every reason to believe that Little Bitty can do it, and we certainly wish him every success if he makes such an attempt.

Next issue—Complete photographs and drawings of the Chupp Little Bitty engine.

Here are some high spots to remember:

Who made the first successful gasoline engine driven model?

When did it make a public flight.

What is decalage?

What are ailerons?

Can you explain the performance curves for the RAF-15 wing section?

What is the technical name for the tail group?

Junior Lockheed Vega Construction Kits

THE construction kits for the model described in February Junior Activities section have proved wonderfully popular. Full-size blue print and all parts and materials are included. These are still available at $1.00 each postpaid. Address AERO DIGEST, Junior Activities Section, 220 West 42nd Street, New York City.

SOARING FLIGHT RECORD REQUIREMENTS OF THE NATIONAL GLIDER ASSOCIATION

PILOTS engaged in contests and individual record attempts in soaring flight should have their attention emphatically called to the following requirements of the F. A. I., represented in the United States by the National Aeronautic Association.

Pilots applying for official recognition of record flights, should submit sworn statements of official N. G. A. or N. A. A. timers and observers to National Glider Association headquarters. If approved by the chairman of the N. G. A. Contest Committee, these reports will be forwarded for official action by the Contest Committee of the N. A. A. These statements should be accompanied by photographs of the soarer or sail-plane used in the flight and of the pilot, both in duplicate. Extra copies for the N. G. A. will be appreciated.

Barographs must be used. The barograph should be sealed and placed in the glider by the official observer or observers and should be left there until removed by such officials. The seal of the barograph may be broken if absolutely necessary by said observers but in such cases, a sworn complete statement of the circumstances should be a part of the official records. The sealed barograph must be then carried or expressed to the Contest Committee, National Aeronautic Association, Barr Building, Washington, D. C. That body refers it to the Bureau of Standards for calibration and only after receiving the report of the Bureau, will the committee pass on the case in hand.

GLIDER RECORD 92 MILES WITH DURATION 14 HOURS

IN view of recent publication of erroneous figures in relation to glider flights of several kinds, the American Motorless Aviation Corporation, of 270 Madison Avenue, has prepared a list of the official records now held by this type of aircraft. They follow:

One Pilot—No Passenger

Duration—14 hours 43 minutes 25 seconds, by Lieutenant Dinort, October 19, 1929, at Rossitten, Germany, in a specially designed Primary Training Glider of the Rhoen-Rossitten Gesellschaft.

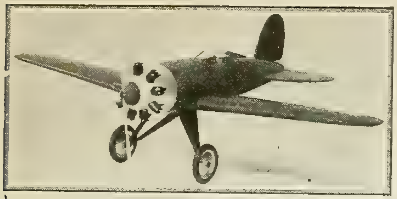
Cross-Country Flight Over Predetermined Course—Ninety-two miles, made by Robert Kronfield, summer of 1929, in a Professeur, standard type of the Rhoen-Rossitten Gesellschaft, at Wasserkuppe, Germany.

Altitude—7,300 feet above point of start, made by Robert Kronfeld, summer of 1929, in a Professeur, standard type of the Rhoen-Rossitten Gesellschaft, at Wasserkuppe.

One Pilot—One Passenger

Duration—9 hours 21 minutes, made by Schultz, summer of 1927, at Rossiten, Germany, in a model of the Rhoen-Rossitten Gesellschaft.—*From the New York Times, February* 16, 1930.

MODELS



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(without cowling)

This two-foot model of Lindbergh's new plane gives unexpected flying results. Using the wonderful Lockheed design and construction, the model presents a fine appearance, especially in the air, and has flown more than 500 feet.

Balsa wood construction is used in this plane, and the set contains cut out ribs, celluloid wheels, two colors of dopes, wire parts, motor and fuselage parts, while the detailed instructions and plans contain many new and unique ideas.

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GROUPING OF COMPANIES

(*Continued from page 82*)

that General Motors had obtained the American rights to manufacture the famous Dornier flying boats. It was also recently announced by General Motors that it was making available to the Fokker Aircraft Corporation its huge sales distribution resources for the marketing of its planes and the financing of its sales on a deferred payment basis. It is expected that eventually the airplane and the automobile will stand side by side in retail showrooms.

Western Air Express, already a powerful aviation company, bears prospects of still greater growth. Harris M. Hanshue, president of Western Air Express, is also president of Fokker Aircraft. Though it has not been definitely ascertained, it is generally understood that the Talbot-Hanshue interests, which control Western Air Express and its four important subsidiaries, also have a virtual control of Fokker.

Allied Motor Industries, Inc., and the newly formed Cord Corporation are two other companies which in time will probably grow to such proportions as to necessitate their being included with the major groups already discussed.

Allied Motor Industries controls the American Cirrus Engines, the Great Lakes Aircraft Company and the American Aeronautical Corporation, as well as several automobile companies.

The Cord Corporation was recently formed to take over the Stinson Aircraft Corporation and the Auburn Automobile Company which puts out the Lycoming aircraft engine.

There is no reason to suppose that this process of merging is at an end. It is not unreasonable to expect that within the next few years many of the hundred odd independent companies will be absorbed by one or another of these groups or that entirely new interests will arise to absorb them.

In any case, this merger tendency will result in a new kind of competition. A competition in keeping with the scientific age in which we live. It will largely be a competition in research. The organization that develops, invents or perfects highly improved types of planes or engines will forge ahead most rapidly. Therefore, it is logical to expect that this grouping and merging of aviation companies will react to the good of aviation in general.

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Airplane and Engine Designing

Our expert instructors prepare you right, for the "big money" jobs. Study in your spare time. Pay as you learn. Employment service.

Learn design and manufacture of airplanes, engines, accessories; aerodynamics, all in one course. Drafting outfit supplied.

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San Diego California

EQUIPMENT

The

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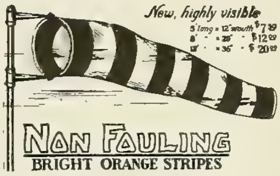
Company

Makers of Wheels

for airplanes

~

Philadelphia and Detroit



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will make fortunes in Aviation. Airplane Drafting and Designing are the biggest jobs ahead in this fastest growing industry. A new field of opportunity for you is opened in our improved method of training.

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Send your name and address today for this amazing new book. It tells all about the big money and startling opportunities in this thrilling new field and how you can qualify for a real job in this fascinating industry.

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Find out all about the sudden demand for daring young men in Aviation, and how you can now secure the basic fundamentals of Aviation, at home in spare time. Send at once for this startling FREE book, *Opportunities in the Airplane Industry.* No obligation.

AMERICAN SCHOOL OF AVIATION

3601 Michigan Ave., Dept. 2773 Chicago, Ill.

AVIATION AT THE UNIVERSITY OF MIAMI

(*Continued from page* 83)

the use of a text of fundamentals and facts rather than adventure and fiction. The University of Miami uses its own text book, written by the department superintendent. The author had had eighteen years of experience in aviation and possesses the particular ability of imparting his knowledge to students.

In response to a demand largely from business men who feel that they must study aeronautics if they are to keep abreast of the times, a night class has been opened. The feature of this class is field management, which includes field selection, and design, equipment, illumination, costs and maintenance, in addition to the ground work. It trains executives. There are few schools along these lines in spite of the fact that there is a great demand for this knowledge by those who do not wish to be pilots or mechanics.

Orders were received in Miami on February 12 from the Navy Department establishing a Naval Reserve Aviation station at the University of Miami. Work on the organization of such a division is to be started immediately, with the selection of four officers and eight enlisted men.

The establishment of the station at the University will mean the placing of from four to sixteen planes in constant use and also calls for twelve men to be located at the school. The establishment of a Reserve Aviation station at the University of Miami comes after many months of negotiations with the Navy Department. The Pensacola Reserve station is being dismissed upon establishment of the base at the University of Miami.

AIR—HOT AND OTHERWISE

(*Continued from page* 62)

indicates that this publication fears the criticism of airline operators, manufacturers, flying schools and possibly YOUR employer who support it with advertising. WE WILL ORGANIZE IN SPITE OF OBJECTORS."

Plain tommyrot. But we had reasons, and we still have them. Some of them are in that file of ours containing brief, official transcripts of "Bankruptcy 1048," as issued by the District Court of the United States for the Northern District of Indiana, Hammond Division, "in the matter of Lloyd H. Atkinson, Bankrupt" (the term being that used by the court) and signed by "Charles A. Burnett, Referee in Bankruptcy." This notice bears the date of April 26, 1929, and calls the "first meeting of his creditors." There were (and are) rather a lot of the latter. In addition to the little fellows whom he owed, were such concerns as the Travel Air Manufacturing Company, Kendall Refining Company, Remington Rand Service, Norman Henly Publishing Company and a score of others—including AERO DIGEST. Perhaps it may be reasoned that it takes real brains to trim a bunch of wise ones possessing such high characters as these. Our thought is, that these are not just the sort of brains, however, which should head a labor union planned to represent the workers of America's aeronautical industry.

AERO DIGEST, as its natural inclination and its necessary business policy, aims to give the pilot (whom it knows as the backbone of the industry with which it has cast its fortune) every help which lies within its power. And that means, very definitely, that it must refuse advertising offered by certain individuals and enterprises. We refused that offered by this Lloyd H. Atkinson. That is one part of our duty to the industry we try to serve—and to its pilots and all others making livings and distinction from it. Therefore:

What a splendid advertisement it ought to be for AERO DIGEST to have refused the advertisement offered it by Lloyd H. Atkinson!

AT just about this time, something good is to be dug out by the real leaders of the air industry from the debris left after the stock market collapse of last autumn. The effect of this collapse, which should not so seriously have touched aviation, was felt by the just and the unjust alike. The just now are properly recovering, and their anger is quite justified as they sit and nurse their injuries. The unjust temporarily remain prone, and this is the industry's moment to see to it, through carefully organized effort (in which it should be easy to secure the coöperation of the financial world), that the same plans and the same men who proved themselves dishonest last autumn have no future opportunity to operate. Certain companies with assets of no sort whatever sold stock for millions of perfectly good money. Crooks, as usual, were more energetic than honest men. During this highly nonspeculative breathing spell, let the seriously minded man prepare ways and means for preventing a repetition of this scandal.

CHILI'S AVIATION PROGRESS

(*Continued from page* 73)

NYRBA Line on his first trip across. After looking at the altimeter registering 19,000 feet and then looking up at Mount Anconcagua he said to the pilot, "That mountain makes Pike's Peak look like a sunken garden." The south of Chile is one of the garden spots of the world, this entire section around Puerto Montt being dotted with beautiful lakes, set like gems in a tiara of magnificent mountain peaks.

The trip in one of the Ford trimotors used by the NYRBA Line takes one hour and fifteen minutes to Mendoza against fourteen hours by the railroad; and the service of the Chilean National Line to Arica, connecting with the NYRBA Line, cuts three and one-half days from present steamed schedules.

Weather and climatic conditions are good for flying in Chile. In the winter months there is considerable fog in the early morning, and in the South, heavy rain; but conditions are much better than in the northern half of the United States throughout the year.

I cannot too heartily recommend that American manufacturers immediately dispatch representatives with airplanes—not catalogs—to develop this field and hold the ground which has been gained there in the past two years. For here is a country possessing in excess of 200 airplanes in its military and commercial services, more than 150 excellent pilots, turning out of its military school fifty pilots each year, and through the Aero Club, twenty-five additional commercial pilots; and where natural conditions, plus a wonderfully air-minded people, properly give the airplane its natural place in the sun.

BY a recent cable dispatch received as we go to press, we learn that Colonel Arturo Merino, director of civil aviation and chief of the air corps, has just completed the first flight from Puerto Montt to Magallenes the southernmost settlement of South America, 1,100 miles, the last 800 of which is over ice-covered cliffs and uninhabited territory. This was a survey flight to ascertain the feasibility of extending the present Chilean National Line from Puerto Montt to Magallenes.

Faultless Vision

with all day flying comfort

THE WILLSON PILOT GOGGLE

THE wind that forces its way under the padding of ordinary goggles and gives the flier "crying eyes" cannot penetrate the sealed air-tight contact which this channel-shaped, pliable rubber mask creates. Only slight headband tension is required to give this sealed contact, and thus the wearer is relieved from discomfort and any tendency toward sinus trouble caused by undue pressure on sensitive parts of the face from excessive headband tension.

While flying, air is forced through the venturi tube (on top of each cup) which partially exhausts the cup interior and so eliminates lens fogging.

Each lens affords a lateral range of vision of 135° and their surfaces are ground with a precision that permits of no image distortion. This frees the flier from those headaches which usually come from eye-strain during prolonged periods of goggle wearing. These Goggles meet the rigid new U. S. Navy Specifications.

The workmanship, appearance, and performance of the Willson Pilot Goggle leave little to be desired.

PRICE
with clear glass $20.00 *per pair*
with tinted glass 23.00 *per pair*

WILLSON PRODUCTS, Inc.
READING, PENNSYLVANIA
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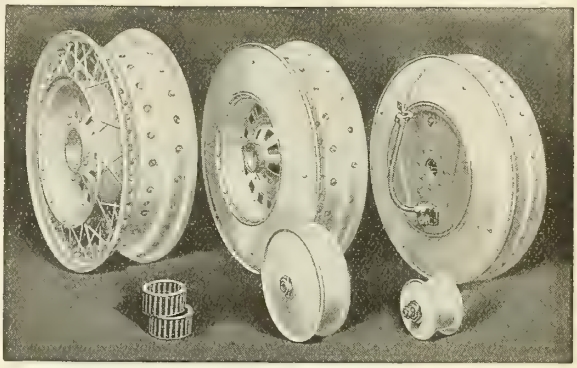
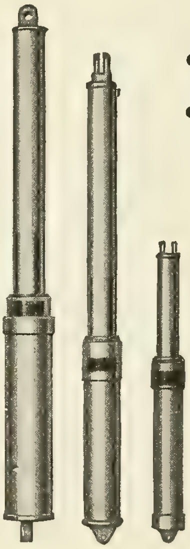


Aircraft Products Corporation's wheels and brakes are manufactured in a range of sizes for aircraft of every type and capacity.

Serving the Entire Industry



Oildraulic Shock Struts are produced in any size or length to meet requirements of individual aircraft manufacturers.

In specializing in the manufacture of airplane parts exclusively, we are rendering a unique service to the entire industry. Our engineering staff has been carefully selected and comprises recognized authorities on specialized phases of aircraft design . . . our manufacturing facilities, geared for straight line mass production, are cutting production costs for America's leading aircraft producers . . . the volume of our business permits modern production methods insuring a greater degree of accuracy and finer workmanship at a lower cost per unit. Put your problems up to us . . . write today. Let us show you how you can profitably avail yourself of this extraordinary service.

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DETROIT, MICHIGAN

Designers and manufacturers of Airplane Wheels and Brakes, Axles and Complete Undercarriages, Tail Wheel Assemblies, Oildraulic Shock Struts. Airplane Skis, Pontoons, Wing-tip Floats, Flying Boat Hulls, Gasoline and Oil Tanks, Numerous Parts and Special Fittings.

Aircraft Products
CORPORATION
OF AMERICA

CANADIAN AERIAL EXPANSION

(*Continued from page 67*)

Two air routes were lighted during the year, one short route from Hamilton, Ontario, through London to Detroit, and the other from Winnipeg to Calgary. Radio beacons have also been installed on the latter route, these being the only ones as yet in operation in Canada.

Canada's government-sponsored flying clubs have also made astounding progress during the past year. Their membership is now 5,095, which is an increase of 2,600. The number of clubs has also increased from fifteen to twenty-three. The Calgary Club leads with 1,060 members, Saskatoon and Regina have 745 and 357, respectively. Which places the leadership in membership in the west. But Toronto and Ottawa have the first and third places in total flying time—Toronto with 1,514 hours, Winnipeg with 1,464 hours, and Ottawa with 1,283 hours.

There are three clubs in the Maritimes, two in Quebec, nine in Ontario, two in Manitoba, three in Saskatchewan, two in Alberta, and two in British Columbia.

Formed essentially to promote flying in the Dominion, these clubs turned out 411 ab initio soloists in 1929. Two hundred and ninety-three members gained private pilot licenses and ninety-seven were given commercial pilot licenses. The number of hours that club members were in the air amounts to 15,736 for the year, which at eighty miles an hour amounts to a mileage of 1,258,880, or just about double last year's figure. Canada has made a wise investment in organizing her flying clubs.

The advance in the number of pilots and air engineers in the Dominion is the result not only of the work of the flying clubs, but also of the aviation schools which have been growing the past year both in number and quality of instructors. There were 341 pilot licenses in force at the end of 1929. Commercial pilot licenses as of December 31st numbered 334. It must be noted that a certain percentage of pilots allow their licenses to lapse during the winter months. In comparison to these figures, there were 154 private pilot licenses and 193 commercial pilot licenses in force at the end of 1928.

Air engineers in 1929 increased in number by 106, making a total of 305. Aircraft licenses recorded at the end of the last year were 409, which amount is 176 more than the year before. Licensed airports have also increased to sixty-eight from forty-four in 1928, visibly showing the growth of aviation in the Dominion.

An area of land larger than England and Wales was surveyed by the Royal Canadian Air Force in the summer of 1929. The aggregate flying time totaled more than 3,400 flying hours.

In all, aerial photographs were made of some 70,000 square miles, of which 24,000 square miles were covered by vertical photography, the remainder being oblique.

Taking stock of natural resources is now an accepted use of the airplane, and an area of over 4,000 square miles in British Columbia was surveyed for that purpose.

A number of commercial operators also photographed large areas last year. Each year more of the Canadian hinterland is photographed for mapping purposes. Cities and towns are also being mapped from the air. Maps made from aerial photographs are now used by all mining men going into regions of northern Ontario and northern Manitoba.

Operations above the Arctic Circle will be considerably increased during the present year, following exploration flights of last year. The Coppermine River district, with its rich deposits of copper, will be opened to mining companies, and Northern Aerial Minerals Exploration, Ltd., as well as Dominion Explorers, Ltd., will make its dash to these new fields as soon as possible in the summer. Flying weather in this part of the country is limited to but a few months. Western Canada Airways will also send planes up, it is expected.

SAY IT WITH FIRES

(*Continued from page 68*)

when otherwise time would be hanging heavy on their hands. In fact, the only suggestion I have to make on that score is that you notify them in advance when you're taking the air with only half the motors running, so they can enjoy the whole show from the start. Why, that big monoplane and the three houses were half gone when they arrived! Now, I ask you, is that fair?

I don't want to complain—for as I said, you flying boys have been mighty good to the firemen—but you just must see their side of the question. Here they are, quite as anxious as you are to see a good fire, and you selfishly go about arranging for it without thinking to call them up in advance and let them in on the fun! You fill up with gas, take off with half the horsepower the manufacturer handed you, and head for a flock of houses. And does it ever occur to you to say to each other, "Here we are, headed for a good crash. Wouldn't those boys at the fire hall like to see this too?" It does *not* occur to you, and that's just what I'm complaining about, and with reason, as I hope you'll agree. Away you go, taking off to a good fire, with never a thought of the brave fireman, whose whole life, you might say, is spent waiting for someone to do something foolish. Then you go and do it, and never tell him. Is that nice? You know damn well it isn't.

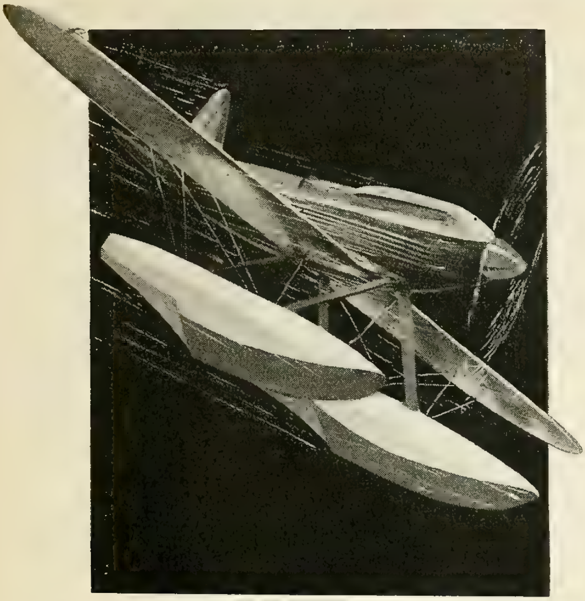
Now, boys, they're not knocking, you understand. You lads in aviation have been mighty generous to the fire departments, and you've been sports enough to pay for it all yourselves, too—for of course the insurance companies naturally pass the costs along to you in the high aircraft rates. That's another reason we like you—you've paid for those fires so cheerfully.

All they're saying is, let them know in advance when you're arranging a fire like that one, and they'll be on hand. In fact, if you'll have our aviation specialist go out to the field, tell him how you're loading the plane, and how many dead motors you're lifting from the ground, he'll plan the course of flight and tell you exactly where the plane will land, and even which corner will hit first. And at that point, of course, they will be waiting, for our specialist will have phoned the fire-house, "Plane number so-and-so, load such-and-such, taking off to the west on two motors only. Remains will be deposited on top of frame house at 123 Dewdrop Ave. Regards to the family."

You see? That's what we call coöperation, and we want more of it. It's important to mention the fully loaded weight of the plane, so we'll know how many men to bring in case we have to lift the wreckage off the pilot. There's nothing more annoying than to get to one of those fires and have to send in a second alarm.

So I repeat, give the details of any experiments like that in advance. In fact, there are any number of instances where it is just as well to call up before you start work. For example, welding is one aircraft operation that we're invariably late for. I haven't seen a good welding job for years. By the time I've got there, the weld was melted, along with the rest of the plane, and sometimes the hangar.

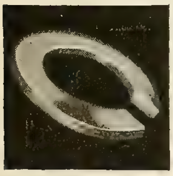
(*Continued on next page*)



SPEED

—it made aviation a success

BECAUSE the airplane travels faster than any other vehicle the aviation industry is bound to succeed. Speed is its password. ¶Speed—in handling, explains also the preference of aircraft manufacturers for Hobbs Lock Washers. Workmen prefer Hobbs Lock Washers because they make a better job, and because they are easier and quicker to work with. Their cost is average but their quality is the highest.



¶We will be pleased to send a generous quantity, free, so that your shopmen can make working tests and comparisons. Be sure to write.

HOBBS MANUFACTURING CO.
Worcester, Massachusetts
(Not members of any combine.)

Speed
Stability
Economy

DAVIS AIRCRAFT

IT's the rare combination of all three of these qualities in one airplane that makes the Davis D-1 Monoplane so out of the ordinary. Here's a cruising speed of 85 miles per hour—with a gasoline consumption of only 4½ gallons per hour. Top speed of 101!

Here's the stability of larger and heavier planes, achieved in the D-1 by the unique wing design characteristic of all Davis Monoplanes. And with it, you'll find an eager response to controls rivalling a pursuit plane.

Here's the exceptional sturdiness and ability to stand punishment made possible by rugged all-metal construction all the way from landing gear to wing ribs. Wing spars, of course, are laminated spruce.

Here, in short, is a thoroughly modern two-place plane which meets equally well the demands of the private owner and the flying school. Read the performance data —write for complete information on Davis construction —fly in it—and draw your own conclusions.

DAVIS AIRCRAFT CORPORATION, *Richmond, Ind.*

PERFORMANCE *(Actual)*

TYPE	D1—LE BLOND 60	D1-K—Kinner 90
Service Ceiling	10,000 feet	14,000 feet
High Speed	101 M. P. H.	125 M. P. H.
Landing Speed	38 M. P. H.	40 M. P. H.
Cruising Speed	85 M. P. H.	105 M. P. H.
Climb	700 ft. per min.	1200 ft. per min.
Fuel Consumption at Cruising Range	4 1/2 gal. per hr.	6 gal. per hr.
Cruising Range	300 miles	400 miles
Price Complete, Fly-away	$3285	$4185

Manufactured under
Department of Commerce
Approved Type Certficate

D1

DAVIS
MONOPLANE

"Sold under licenses covering all of the patents owned by members of the Manufacturers Aircraft Association, Inc."

(*Continued from preceding page*)

And all the other firemen say the same thing. Not that they complain about welding, mind you—they like it. The only trouble is they never see the start of it.

In some few cases, however, we firemen had legitimate cause for complaint—the fire started, but was instantly put out by someone with a hand extinguisher. Now that's hardly fair. Out of fairness to the fire department, large fire extinguishers should never be on hand when welding is being done. Let me give you a few of our thoughts on this important matter.

When you decide to do some welding on a plane, don't move the plane outside—leave it in the hangar. One airplane burning all by itself in the center of a field is hardly worth going to see, though of course if that's all you have to donate, through not having a fire extinguisher handy, why, we'll go and look at that.

But what we say is this: why burn up only one airplane when you can just as easily burn up a dozen airplanes—and the hangar as well? Why do a retail business when wholesaling is more dignified and expensive?

Don't put the airplane out doors to do your welding if by any chance you can do it inside the hangar. Also, to have the plane near the door, and the tail of it on a dolly, so in case it catches fire you can shove it outside, is just a dirty trick on the firemen. The thing to do, for the good of the department, is to have the airplane at the *rear* of the hangar, with, say, a dozen other planes between it and the door, so you can't possibly get it out in case it catches on fire. Then, next day, we can all have a frolic while the insurance man is figuring up how much to raise the premium rate on your next contract, to help take care of the loss you have already incurred.

There's one thing we firemen want to take this opportunity of thanking the mechanics and hangar chiefs for, and that's for those boxes and barrels of oily waste that are usually stored in the back of the building, or in some corner, or right beside the heater, waiting until Saturday morning to be emptied, if ever. You'll sometimes see firemen on their afternoons off wandering around a hangar, admiring the barrels of waste and old fabric that are sitting there, waiting for spontaneous combustion to set them off. In fact, the average fireman gets more fun out of just looking at one of those barrels than he does out of a movie. If he's at all imaginative he can picture that thing smoking and gently bursting into flame.

Speaking of smoking reminds me of another standard practice in aviation that is marked high on our favorable opinion report. We're in favor of smoking, especially cigarettes, that burn after you throw them down. Of course we don't disparage pipes—especially those that don't draw well, and have to be relit frequently, for they enable the smoker to throw his match where it will help us. We like pipes well enough, but we actually love cigarettes, for cigarettes have done more for the nation's fire departments than they have for the nation's slenderness. "Reach for a cigarette instead of a fire extinguisher," is one of our slogans.

A thing we encourage is the aviation education of the public. "Make America air-minded," is our motto, and as the best way to do that we suggest letting flocks of the public wander around the hangar where expensive airplanes are stored. The more of them who smoke, the better we like it. For there's always the chance that one of them will throw his half-finished cigarette in a pile of greasy waste that someone has left on the floor. Never request people visiting your hangar to stop smoking. They like to watch a good fire as well as we do. Don't be selfish. What do you care if the hangar burns down?—The insurance company pays for it, and you don't have to pay them back until they write a contract for your next year's insurance.

Smoking in airplanes is another procedure that we think highly of. We had one out on Long Island recently that stopped us yawning for a while. It seems a mechanic sitting in a cabin plane decided to have a little smoke, only, as luck would have it, the lighted cigarette slipped from his fingers and dropped behind the seat, fortunately landing on a velour cushion, that immediately caught fire. The mechanic, however, was a man of action, so he signaled the pilot to land, and threw the cushion out, but not before the fire had communicated itself to the upholstery of the cabin. It was impossible to throw the whole cabin out, so they compromised by throwing themselves out when the machine stopped rolling. The fire, now blazing merrily, was enjoyed by everyone but the firemen, who didn't get there until the machine was destroyed.

In future, for the good of the department, will you call us up when you are going to smoke in the air? Then stay over the field or over the fire house—until the fire starts. Then bring the plane down where we can all enjoy it. Don't be selfish.

And give us a break now and then, please. If a gas tank starts leaking, just a small leak, don't put the machine out of service for repairs, but fly it until the leak really amounts to something. That is by far the better way. Since tanks are a trouble to get out, why take them out for a little leak? It's as much work to take them out for a small leak as it is for a large leak. Let the small leak go, so it will drip on the floor of the hangar, where a visitor may get at it with his cigarette. If there's anything I like, it's a hangar with a good rich gasoline smell.

And oil—I like to see lots of oil around, and lots or oily waste. I start to hope for the best as soon as I see a dirty hangar, for those are the ones that usually go up with a bang.

Another hopeful sign is to watch a plane being refueled while a flock of Sunday visitors, many of them smoking, are standing around watching the process. Don't drive them away, under the plea that they may endanger themselves and your property. Let them stay right there and learn about high test gasoline. They have to learn some time, and they might as well learn from your gas pump as any other.

To firemen, one of the most delightful spots in aviation is the space between hangars, where old crashes are stored. Of course, we enjoy old wings and fuselages leaning negligently against hangars, but when we find them *between two hangars,* where they can more easily act as a fire conductor from one hangar to another, we're simply overjoyed. If you chance to notice a fireman gazing fondly at those wrecks, don't mistake him for a Fire Inspector—it's only one of the boys enjoying himself and planning for the future.

Well, I've said enough to give you an idea of what the firemen are after—coöperation and friendly sympathy. Don't let us go stale in the engine house. We don't have half the fun we used to have before sprinkling systems were invented, and before the second hand clothing business got too profitable to burn up every Sunday. They even took away our horses, so we can't gallop to a fire. Now all that's left is the fire itself, so help us along with them. Let "Say it with Fires" be an aviation slogan—you've been saying it with fires quite frequently, anyhow, so you may as well make it a regular part of your program.

Just a word about myself before I close and go out to Roosevelt Field for a smoke. I've been able to solve a difficulty of the New York Fire Department, in reward for which as a special honor I am to be presented with one of Groven Whalen's used high hats and a pair of his second-hand spats. It seems the New York Fire Department has experienced difficulty in getting to fires, because of the congestion of the streets. Frequently the fire was out before the boys got there, through burning up all the available supply of combustibles. In one instance, the fire engine was stalled in a flock of cabs only a block away, but couldn't budge an inch. In fact, the only way they got that engine to the fire was to disassemble it, carry it in pieces through the crowd, and assemble it again at the fire. All this took time, of course, so I suggested that the best way for New York to handle it's combined traffic and fire trouble was to keep the engine already disassembled in the firehouse. Then when the bell rings for a fire, each fireman grabs a nickel and a piece of the engine, and runs down the subway with it, and goes to the fire. When they all get there, they assemble the engine and put out the fire, if it's still burning.

Well, they tried this plan, though with small success. They had a fire on upper Broadway, and started off to catch a Van Cortlandt Park Express, when by mistake the fireman carrying the nozzle hopped aboard a Bronx Park train. But I've changed that. My improved plan is to have all the boys tied together with a rope. Then, if they do take the wrong subway train, they'll all be together, so they'll have the engine to assemble and drive home.

However, this is only temporary. I'm working on an aerial fire engine that will fly at very slow speed and actually hover over the fire, so the firemen can drop water or moth balls, as desired, directly into the building. This plane works on the principle of the autogiro, crossed with the Curtiss Tanager as soon as they decide who owns slotted wings. I'm going to call it the Autocyro, and ask Sam Bradley to license it through the manufacturers' association. I have given Mayor Walker my word that this machine will go into production on the very day the Coast Guard stops the flow of liquor into the U. S. A. This gives me lots of time to perfect the design.

SIGNIFICANCE OF GLIDERS

(*Continued from page* 55)

proofed. Deciding on a change in airfoils, they chose a double-camber section that was more expensive to manufacture than the original wing, but which had the desirable characteristics of burbling slowly when stalled while retaining a high lift at slow speeds. The new wing was built and installed. It proved the solution. If a student inadvertently stalled the glider immediately after the snap-off, the machine would "mush" down slightly instead of slipping off suddenly on one wing and the pilot had ample warning to nose down and gain speed.

Good inherent stability, especially fore and aft stability, is absolutely essential in a training glider. An unstable glider is soon a cracked up glider.

The success of the final design led us to plan a heavy schedule of glider production for 1930, for there is every indication of a good market. During all seasons, we will manufacture gliders as a sideline to production of powered aircraft.

By utilizing existing factory machinery, wing jigs, airplane construction methods and trained personnel, we found

(*Continued on next page*)

GLIDERS INC.

The First Step in Flying—
THE DETROIT GULL

Aviation experts agree that gliding offers the most satisfactory method of air training preliminary to motored flight. This fascinating and instructive sport is rapidly becoming popular.

Gliders, Inc., a division of Detroit Aircraft and builders of the Detroit Gull, are the pioneer manufacturers of motorless aircraft in the United States. The Detroit Gull is the result of 18 months of intensive engineering research and flight tests—and incorporates only proved principles of design.

The Detroit Gull is used by gliding clubs throughout the country. Their records have established that it costs practically nothing for upkeep. As high as 800 flights have been made with only minor expenses for repairs. Inexpensive, gliding is also a thoroughly safe sport.

Sturdy in construction, the Primary Type Detroit Gull is built to stand hard usage. The wing span measures 34 feet and the length overall 17 ft., 7 in.

The Detroit Gull is popularly priced at $435, complete with launching rope and safety belt. Why not form a glider club in your vicinity and enjoy this thrilling sport? Write today for our illustrated folder and complete information.

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GROSSE ILE AIRPORT, INCORPORATED
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AIRCRAFT PARTS COMPANY, INCORPORATED
DETROIT AIRCRAFT EXPORT CORPORATION

(Continued from preceding page)

we could manufacture and sell a sturdy, inexpensive machine. Within a few weeks after our announcement we received several hundred interested inquiries. The glider movement is rushing on in "seven league boots."

There is every reason to believe that gliding will create a new army of airplane boosters. The chief incentive to glide naturally lies in its low expense. It opens, or rather broadens, the field.

As an illustration of the hold gliding has obtained on public imagination, let me review our first sale of an Alexander Trainer, as we call our primary-secondary glider. A group of young and middle-aged Colorado Springs business men watched factory glider tests Sunday after Sunday. Finally they grew interested to the point that they organized the Pike's Peak Glidaire Club, Inc., and bought the first glider off the line. Out of this group we expect to sell two or three airplanes some day.

The next sale of an Alexander Trainer illustrated another great field for glider development. O. M. Mosier, president of the Pike's Peak Air Commerce flying school, one of the West's largest, flew the glider half a dozen times. It impressed him as an ideal way of imparting flight fundamentals to his new students and teaching them not to lose speed in a turn or land too high in the air. He reasoned it would save them a number of hours of pre-solo instruction and later polish up their technique between airplane lessons. Inasmuch as he guarantees a license with each course, any means of speeding up student training would mean money in his pocket. It also would provide a pleasant and instructive amusement for the students while waiting for "time." He bought the second glider.

My own experience has convinced me that gliding is an excellent basic training for the operation of powered aircraft. No matter how expert, a glider pilot could not expect to solo an airplane safely on the strength of his gliding alone. But he should be able to do so after a few hours of instruction.

The best airplane flying is done subconsciously. Seventy-five per cent of preliminary training is a matter of instilling this subconscious ability in the individual. A pilot must control the ship without thinking ahead about every movement.

Extensive gliding builds up the subconscious faculty in the novice. After sufficient experience, he instinctively corrects a wing-low, nose-high attitude without considering it in his mind first. Gliding develops a fine "feel" of the air. The pilot sits in front of the wings and cannot gauge his angle of attack as the airplane student does by sighting the horizon along the nose. A glider pilot must feel his air speed, especially when he is trying to soar a bit in an updraft or strong wind.

An airplane pilot must be able to feel his air speed in order to land his plane properly on three points. With glider training, he will master the 'three pointer" much sooner than will his less favored fellow student.

Several hours of airplane instruction often are devoted to familiarizing the airplane student with being aloft. If he has soloed gliders innumerable times, the mere fact of being up no longer appalls him. Gliding breeds confidence in the air as a supporting medium and steadies the student at the outset.

At the Alexander Airport young men who had never handled airplane controls have been towed to an altitude of 150 feet where they cut loose and made a gradual 360-degree turn before landing. The maneuverability of a glider is limited only by the altitude it can reach. Towed by a wire line 500 feet long, it can reach a height of over 300 feet. From this altitude the pilot can make a 720-degree spiral, many "S" turns, and even a figure eight or two. From an altitude of 300 feet, the pilot can easily glide 3,000 feet or more. The capacity of a glider to maneuver up or down wind and afford good training is generally underestimated.

There is a certain exuberance to gliding that appeals even to old airplane pilots. No propeller wash in the face, no bothersome instruments to watch, no engine to miss fire, and no need to worry about rolling into a hanger or bouncing on landing, for a glider when brought to the ground stops within a few feet. The tail is not pulled down as in landing an airplane properly. I have enjoyed several hundred hours of flying, but I can remember few sensations to equal that of soaring a bit in a hillside updraft. You hang almost motionless in the air. Better than ballooning.

The Eaglerock distributor and dealer system has received the glider with marked enthusiasm, and I believe that the majority of airplane agencies over the country are ready to enter this field. Many of our distributors are assisting in the organization of clubs preparatory to getting their demonstrators.

All in all, I see in gliding a fresh spurt for American air-mindedness.

INDIVIDUAL SALESMANSHIP

(Continued from page 74)

of M——. She dearly craves publicity and delights in believing that the less fortunate members of her sex are envious of her wealth and appearance. D—— is indeed an excellent prospect.

E—— is a distributor who has an agency covering two states. Five men, five cars, and five expense accounts are on the road constantly. The territory covered by him is sparsely populated. One could with safety "set down" near any town in his territory. By using E——'s own selling costs and his pin studded map, plus a demonstration consisting of a visit to several of his distant dealers via air and in a day's time, one would in all probability sell an airplane and instructions.

F—— is a wealthy business man who recently lost his wife. His two small children are in the care of a sister residing at a distance. F—— cannot visit them as often as he wishes because of the time lost in travel. I would certainly see that F—— visited his little ones via air and that he is made to realize that distance means little when one possesses an airplane. The town of M—— holds many other prospects, small though it is. Persistent sleuthing and salesmanship will put M—— on the air map, and at a profit.

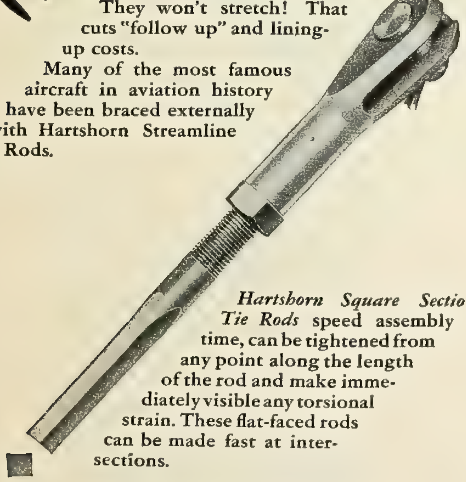
The combination of salesman and pilot may be hard to find at present, yet one of each could well spend their time in M—— or its counterpart and profit mutually from the other's skill. Eventually the salesman would become a pilot as well, and the pilot, a pilot-salesman. There is no experiment to be made. Turned loose in M—— or any other average town, the combination would make good, but not in three days. I specifically do not refer to order takers.

In conclusion, those in the aeronautic industry ought not to be disheartened just because the business seems to have side-slipped into a small tight field that is rather rough. Many others who blundered worse got out and made good. Before the aircraft industry gets out it is going to recruit a few gabby corporals here and there and get right behind them and their efforts. They will sell airplanes to people who will wonder why they bought them up until the day they find they cannot get along without a better one.

For more *Speed* and *Less Fuel*

Brace Aircraft with Hartshorn TIE RODS

The non-stretching, strong streamline tie rods perfected by Stewart Hartshorn Co. offer little wind resistance. That increases speed and reduces fuel consumption. They won't stretch! That cuts "follow up" and lining-up costs. Many of the most famous aircraft in aviation history have been braced externally with Hartshorn Streamline Tie Rods.



Hartshorn Square Section Tie Rods speed assembly time, can be tightened from any point along the length of the rod and make immediately visible any torsional strain. These flat-faced rods can be made fast at intersections.

Brace every plane you build or fly with

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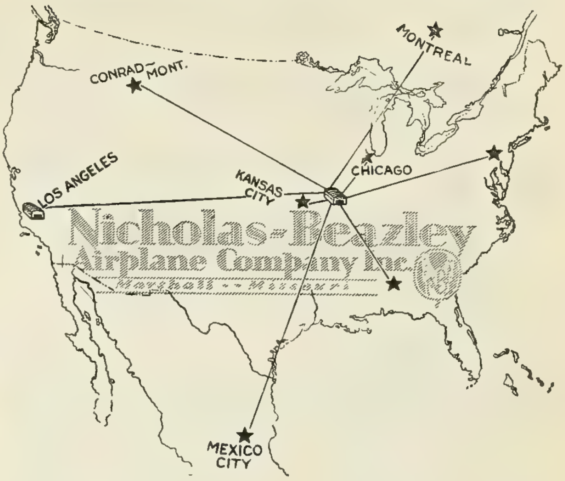

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When Lindbergh made his historic flight, his ship was equipped with "parts and supplies by Nicholas-Beazley." On almost every other important flight, we have been represented by various parts and equipment.

Aviators in all parts of the country have learned to depend on Nicholas-Beazley—and the unfailing response of this pioneer company has won for it the well-deserved title of "the World's Foremost Aeronautical Supply House."

Our vast stock—of more than 100,000 items—is kept always up-to-date. "We ship the same day" we receive orders. Intelligent filling of orders and prompt delivery are conveniences which have added to N-B prestige.

Our stock is made up of *quality* merchandise—and sold at prices which are eminently *right.*

Our latest catalog lists the most complete line of quality aeronautical equipment parts and supplies of any house in the country. Write today for your copy.

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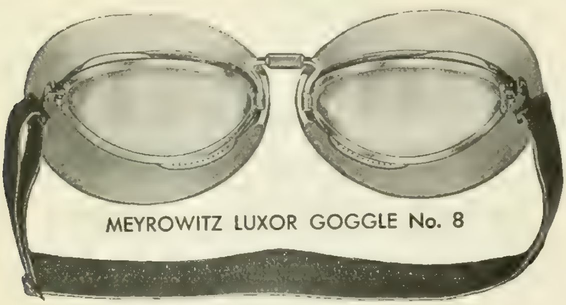
Now you can have

Non-Shatterable Lenses in Your

LUXOR GOGGLES



MEYROWITZ LUXOR GOGGLE No. 8

...not in the plain window-pane type...not in the ordinary bent lenses, but in perfectly ground *spherically* curved lenses — providing absolute safety and correct vision for flier's eyes. Spherically curved ground lenses avoid disagreeable and dangerous distortion, blurring and reflection. They provide a correct and unusually wide angle of vision at all times and under all conditions. The combination of these features is a scientific achievement, perfected in the Meyrowitz laboratories—and will be found only in Luxor Goggles.

Never before has optical science achieved true spherically deep-curved ground lenses in non-shatterable glass.

Note the perfect curvature from end to end and from top to bottom . . . an absolutely accurate spherically deep-curved lens.

In addition to non-shatterable spherically curved ground lenses, the new Luxor No. 8 is notable for the new WIDE, FLARING FEATHER EDGE CUSHIONS which provide better protection with no pressure; DURALUMIN FRAMES for lightness and strength; MICRO ADJUSTABLE BRIDGE: NON FOGGING VENTILATING CIRCUIT to prevent sweating, fogging and to keep air currents and foreign matter away from the eyes.

THE NEW

LUXOR GOGGLES No. 8 — optically ground and polished lenses, either Army or Navy specifications $18

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520 Fifth Ave., Dept., A., New York

RADIO RECEPTION VS. INTERFERENCE

(*Continued from page* 61)

laboratories in this development, and they are glad to give the benefit of their experience to the manufacturers of their equipment, or to any others who may be interested. But they cannot be expected to continue indefinitely rebuilding their equipment as soon as it is received from the factory in order to meet the ordinary needs of transport service.

When the Department of Commerce makes the use of radio compulsory, it indirectly implies that complete shielding and bonding shall be installed. Poor shielding is not only useless from a radio point of view, but it may also seriously impair the ordinary reliability of the engine and the plane because of short circuiting or fire. The next logical step for the Department of Commerce to take will be rigid requirements in respect to the adequacy of the shielding from a radio point of view, and also certain specifications regarding the safety of the electrical changes involved. There is little doubt but that a code similar to the rules enforced by insurance underwriters in the building industry is badly needed in aviation. The manner in which the electrical wiring is installed on some of the present-day ships makes them distinctly unsafe for transport use. Because the wiring is out of sight, it is apparently out of mind too.

Up until the present time shielding has been an afterthought in the design and construction of airplanes. There is no doubt but that a general reconsideration of the problem should be undertaken, in order that shielding may be made an integral part of the final product. There is an opportunity here to improve the entire electrical installation in airplanes, and make them more reliable than they have ever been before.

As an example, the wiring can be run in light aluminum conduits fastened permanently into the fuselage in much the same way that houses are usually wired. The conductors are protected from moisture, gasoline and oil, and in the event of a short circuit the danger of fire is greatly reduced. Furthermore inspection and replacement of the wires is possible without tearing the ship apart, and if additional circuits are later required, they can be added quickly and conveniently. This method of construction is particularly desirable for protecting wires running to and from the engine, in which case flexible aluminum "BX" has been used to avoid breakage due to vibration.

Wiring can be dispensed with, and the electrical reliability of the engine improved with an arrangement whereby the starter engaging switch also puts the booster coil in operation. It is then possible to mount the coil directly on the engine and keep all the leads short and direct. Another possibility is to design the magneto grounding switches as an integral part of the magneto and close them by retarding the spark control to the extreme position. The latter two changes are particularly desirable from a radio standpoint, because it has been found that a large amount of the ignition interference is carried back into the wiring of the plane by the leads from the magnetos to the grounding switches and the booster coil, unless they are particularly well shielded.

Another highly important factor is the sheath enclosing the high tension wires from the magnetos to the plugs. It has been the experience of most transport operators that no form of braided wire covering has proved fully satisfactory. Deterioration of the wire beneath the covering as a result of gasoline and oil soaking through is one difficulty, while another is the inability to inspect and replace the wir-

(*Continued on next page*)

DESIGN

Buhl produced the original closed sesqui plane in 1927—two wing construction with the lower much smaller in area than the upper. The advantages of this type are many. Primarily it has the strength of the biplane. The upper span, shorter than in mono design, requires less hangar space and gives faster manoeuverability, and easier landing. It has greater inherent stability and permits slower and safer landing speeds. The takeoff is quicker. There is far greater strength per pound. Buhl planes carry no load on the tail. The wings with their double camber have a very small center of pressure travel and carry the load of the cabin and passengers. Structurally, a Buhl has never failed. May we send you detailed information?

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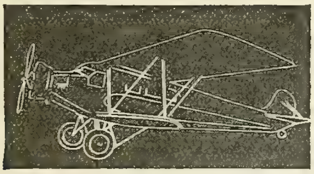
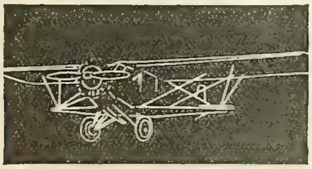
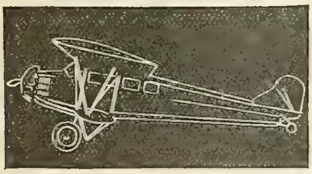


The Buhl Senior Airsedan is an eight-place dual-control plane, priced at $18,500 with the Wasp engine and $19,500 with the Hornet or Cyclone.



The Buhl Sport Airsedan is a three-place dual-control plane, priced at $12,000 with J-6 Wright Whirlwind engine and $11,000 with the J-5.



The Buhl Standard Airsedan is a six-place, dual-control plane, priced at $13,500 with the J-6 Wright Whirlwind engine.

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Air Sedans
SENIOR·STANDARD·SPORT

NO OSCILLATION SURETY OF OPENING
STEERABLE

DESIGNED BY HOFFMAN

Everything you want in a PARACHUTE

1. *Certainty of opening*
2. *Rapid opening*
3. *Low shock on opening*
4. *Steerability*
5. *No oscillation*
6. *Slow rate of descent*
7. *Comfort to wearer*

E. L. Hoffman, "Father of the Parachute," after two years of intensive experimental work with every available scientific aid, has perfected the 'chute which incorporates every improvement in performance—The Triangle Parachute.

A radically different design of both the main chute and pilot 'chute assures quick opening under all conditions.

This quicker opening, however, has been attained with far less shock to the wearer. The triangular shape eliminates oscillation and makes possible a positive control of direction by manipulation of the risers on the round corners. This, coupled with the lower rate of descent, makes standing-up landings easy . . . even for the novice.

Every accessory to the 'chute is newly designed:—

A scientific packing case, incorporating absolute protection to the 'chute—positive ejection of pilot 'chute—improved rip cord arrangement and rip cord handle—specially designed shroud line retainers—a stronger but more flexible and more comfortable harness—stainless steel, newly designed fittings which never tarnish.

Actual tests, in a specially designed wind tunnel and many drop tests, have not only determined the behavior of every conceivable type of parachute design, but also have very definitely proved the practical advantages of the improvements incorporated in the new Triangle 'chute.

Write at once for full details.

Do not trust to luck when flying! By all means equip yourself with a good parachute, for it is too late to send for one when an emergency arises.

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THERE'S more than that! There's a BETTER job and a BETTER future for YOU in Aviation than in ANY other industry because Aviation is *just beginning* its period of BIG GROWTH.

A few years ago a lot of fellows saw *their* opportunity when the automobile and radio industries were young. They got in early and literally "cleaned up." Today thousands of those "early-birds" are wealthy.

That's the *kind of a chance* YOU HAVE in Aviation today. During the next few years Aviation is going to pick its bosses, its high-priced specialists, its leaders and executives. And YOU by LOOKING AHEAD and ACTING AHEAD—can be one of them.

What is more, to fit yourself for an important place in AVIATION—it isn't necessary for you to leave your home, give up your present job or spend a lot of money. Instead, give me just a part of your spare time during the *next few months*, and I'll give you the kind of training that employers need and are paying REAL CASH to get.

I'll do *even more!* I'll actually help you get a job. You will receive the *free* assistance of my Employment Department. This department is called upon for trained men to fill "ground jobs" and "flying jobs" that pay REAL MONEY and offer REAL FUTURES.

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(*Continued from preceding page*)

ing. Breakage of the cover, which is very fragile, is frequent even when extra care is taken in handling. A solid type of harness which is readily removable from the engine, and in which the wiring may be periodically inspected and renewed, is badly needed at the present time. Nothing of this type is as yet available. A standard type of connection between the harness, the magnetos and the spark plug shields should be agreed upon. At present few are interchangeable. These matters are properly the responsibility of the engine manufacturers, because the final performance of the engines under actual flying conditions should be of vital interest to them.

There is no doubt but that radio is coming, and that most of the transport planes at present in use will be equipped by the end of this year. But in any event, the effectiveness of the part that radio can play in providing safer and more reliable transportation, depends largely upon the elimination of ignition interference.

Next month will be described the work which is being done by some of the large transport companies to provide two-way radio telephone or telegraph contact with their planes while they are in flight. They are not only using the radio beams and hourly broadcasts of weather from the Department of Commerce stations, but many ground stations have been installed at the expense of these companies for the purpose of talking to their own planes, thereby insuring the greatest possible safety to their passengers and pilots.

SLIDING ROUND THE SKY

(*Continued from page* 56)

passengers can play bridge and throw peanuts at the birds as they go by. But when it gets near the ground it is about as handy as a blindfolded elephant in a teashop.

When airships get over their growing pains and have nothing to do but attend to business and pay dividends, it may sometimes happen that somebody will want to go ashore from them without calling out the National Guard and scaring all the neighbors' chickens by putting down half a mile of airship across the countryside. If the airship is on war duty, a scout might need to come down to use the telephone, or an officer, to have his photograph taken. On a peaceful passage, a passenger might discover he has forgotten his toothbrush or had left the gas burning in the apartment. Whatever the reason, some way must be found to unload without stopping five million dollars worth of airship, and the glider may be it. At any rate, it was worth trying.

Before the method becomes thoroughly popular, however, gliding has got to be taken up by our best people in a serious way. It looks just now as if this is going to happen. The fact that there are only nine—or is it ten?—licensed glider pilots in this country doesn't mean that only nine or ten people have glid. A good many airplane pilots have tried their luck on a glider and liked it. A good many amateurs are flopping around in the air without benefit of gasoline and surviving it surprisingly well. And possibly there is as much scientific research and experiment going into gliders today as into internal combustion aircraft.

With the spring season coming on and March winds gathering steam, we can probably look for a busy gliding season. Small boys will be sliding off the roof on a contraption made of beaver board and mother's old corset, and the guardian angels will have to work overtime. Foot

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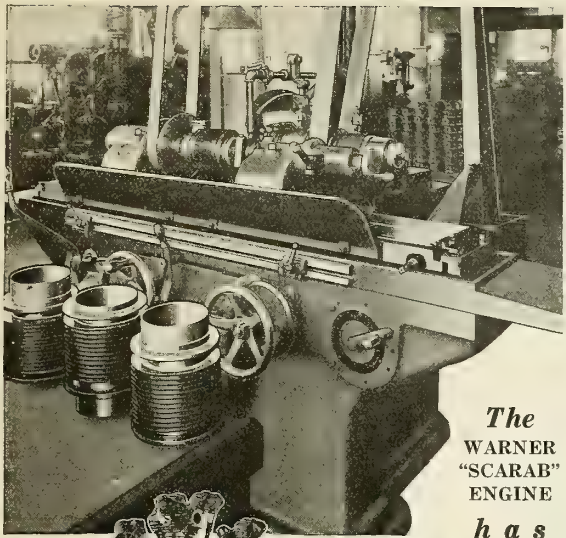

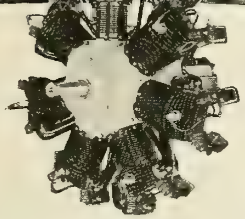

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WARNER
"SCARAB"
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Cylinder Head, Cylinder Barrels, Crankcase, Gear Case, Pistons, Oil Pump, and Bearing Sleeves

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AIRCRAFT *DEMANDS* *UTMOST* PRECISION

THE sustained high speeds of aircraft demand accuracy and precision of the highest calibre in engines.

Skilled engineers and accurate machines enable the shops of Govro-Nelson to produce airplane engine parts with the greatest degree of accuracy.

The cylinder barrels pictured above in the process of machining are but one of the many parts produced by Govro-Nelson with painstaking care and precision for the famous Warner "Scarab" motor.

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of their design—the stationary coil, armature and contact breaker —which provide

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The majority of modern American Aeronautical Engines are equipped with Scintilla Aircraft Magnetos.

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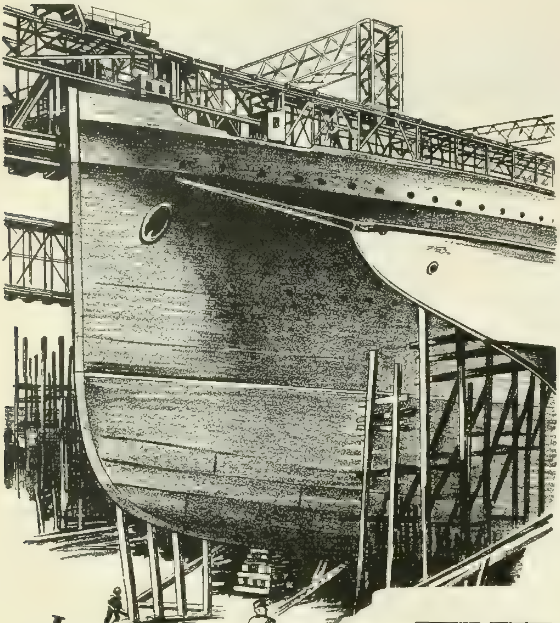
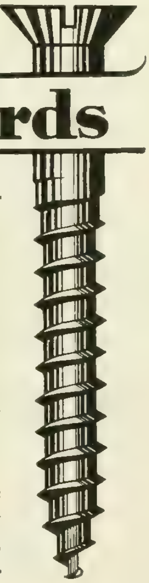


In the
Big Ship Yards



Liners, freighters, yachts — all of them have to undergo seasonal overhauling. They are like new when they come out — sides shine with new paint — inside and out they are sound and ready for another season on the high seas.

In this overhauling work, there are a multitude of uses for screws. Experienced shipbuilders select American Screws for these jobs because they can trust them. They know that the strong bodies of American Screws will stand up under automatic driving; that they will hold fast in spite of unusual wear.

Specify American Screws

Send for our chart showing types and sizes of American Screws.

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PROVIDENCE, R.I., U.S.A.
WESTERN DEPOT, 225 WEST RANDOLPH ST., CHICAGO, ILL.
"Put It Together With Screws"

(Continued from preceding page)

hills in the windy states will have a boom, and real estate operators will be selling a good gliding climate along with the rest of the scenery. And we shall have a new crop of records on our hands, with a prominent place in the talking pictures waiting for the man who can glide to the top of Pike's Peak or cross the continent by air without writing a testimonial to somebody's gasoline.

I have never glid. My sense of balance isn't what it ought to be, and I don't think anything can be done about it at this late date. The best I have done in this line was when I went skating this winter with the younger members of the family, who will not make allowances for the fact that I grew up in a country where ice is something in which fish are packed. They would not believe that I had never been on a skate in my younger days, and were trustfully convinced that I could do it if I put my mind to it.

Several of the neighbors assisted in getting me to mid-ice, propping me on all sides until I announced that I was ready to cast off. Then they went away and left me there. One of my feet immediately became impatient and started off up the creek; the other grew timid and decided to go home. Nothing that I could do seemed to bring them to any sort of agreement, so I sat down on the ice and felt very sorry for Admiral Byrd and his merry men in the Antarctic.

On a second attempt I managed to keep my feet in some sort of mutual understanding, but couldn't keep the pace they set. They went off up the ice like a Schneider Cup seaplane, while the rest of me stayed behind. Under the circumstances, I made another forced landing. On the third attempt I did better. I fell down, it is true, but managed to execute a figure eight, two sixes, a seven and an Immelman turn by sliding all over the ice on the collar-button of my spine. At which point I gave up skating.

So when I speak of the fascination of gliding, it is not from the enthusiasm of experience nor from any immediate intentions of trying it. It is just that it seems a good idea, and as much like true bird-flight as anything that man is likely to accomplish. In the days of long ago, when I used to hop the fence at Asbury Park to watch Mr. Wright and others climb into the sky and back again, it was considered the thing to call the aviators "birdmen." As a matter of fact, a pilot is no more a birdman than a ferry boat captain is a fish. A bird doesn't fly by sitting in the middle of a mess of machinery and watching an assortment of gauges, clocks, dials, thermometers, barometers, inclinometers, hydrometers, tachometers and other gadgets. He doesn't pull himself along by the revolutions of his own nose, nor manufacture a gale on which he can ride like a kite. He just matches his wits and instinct against the air currents and works his wing muscles, which is what the gliders have been doing ever since Leonardo da Vinci thought of it and Lilienthal did it. The latter gentleman made over two thousand gliding flights before 1896, which shows that the game isn't as new as it seems to be.

The serious side of aviation is more a matter of horsepower than of beating the bird at its own game. Aviation never had a commercial chance until man made a few pounds of metal work as hard as a horse. And now that we have made engines powerful enough to fly a grand piano or a plain barn door, the motorless glider gets its turn again. The free and enterprising spirits are going back to an old experiment, fortified with new knowledge, better materials and design, and a quarter-century of valuable experience.

(Continued on next page)

Line-up of planes at East Boston Airport

CURTISS-WRIGHT FLYING SERVICE AT BOSTON

Recently constructed hangar of the Curtiss-Wright Flying Service at East Boston Airport.

has always used Socony

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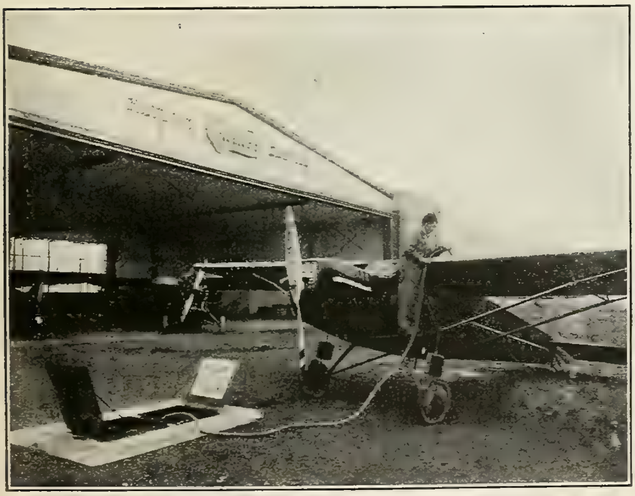

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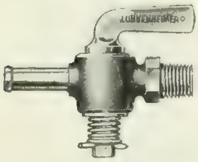
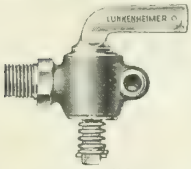


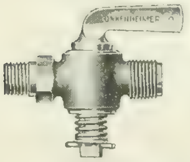
20% LIGHTER

Fig. 1669
Male Pipe with Hose End



23% LIGHTER

Fig. 1670
Male Pipe with
Elbow Hose End



25% LIGHTER

Fig. 1686
Male Pipe with Union End

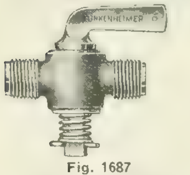


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Fig. 1687
Double Union Ends

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(*Continued from preceding page*)

Something is sure to come of it.

The thing that is most likely to come of it is a new element of safety in aviation. The glider should tell us a lot which is drowned out of hearing by the racket of an aviation engine. It should reveal the remaining secrets of balance and stability and take some more of the mystery out of meteorology. It may even have its place some day in the training of every pilot. It may be found wise to teach him to trust his wings and his wits before he learns to trust too much to his motor. And some of the accidents of recent date could properly be blamed on overbalancing horse-sense with horse-power. There are times when old man weather must be treated with full respect, even by a trimotored transport.

This particular stage in civilization is pretty badly bothered by the problem of controlling the power which it has created. A man on his own two feet can travel far without hurting himself, and if he does fall down or run into something, it rarely spreads him apart beyond repair. But when he extends his muscles with machinery, he manufactures a mess of dangers and invents a score of ways of coming to an abrupt and convincing conclusion. In 1928, for example, 23,765 people were killed in or by automobiles. The rather impressive total of 2,583 more were eliminated by running cars into trains or trolleys. According to the Interstate Commerce Commission, 6,500 persons were killed as a result of railroad operation in 1928 and 85,560 injured. All through the world of machinery the casualty list is found, and safety campaigns and legislation never quite wipe it out. For twenty years or more, for instance, the law has been regulating boilers and their operation and you would suppose that by now a boiler was a tolerably safe plaything. But in 1928 there were 1,034 boiler explosions, which killed seventy-eight persons.

The casualty list of civil aviation in the same period was 368, though airplanes flew about 70,472,000 miles during the year. You are therefore probably safer sitting on a boiler than in an airplane, though you will get considerably less fun out of it. But a glance at these and further figures reveal the fact that the casualty rate per mile was lower by air in 1928 than it was by railroad. In order to break your neck in an airplane during that period you would have had to fly 191,500 miles, whereas you could—according to the same law of averages—count on a harp and halo at the end of 172,768 miles by rail.

There is, of course, a joker hidden in these figures, as in all statistics. The joker is that the casualty rate is based on mileage of trains and planes, rather than on the total of passenger travel. If it were based on the gross mileage traveled by passengers, it would soon appear why insurance rates on railroad risks are figured so low. Riding in a railroad train is an uncommonly poor way of committing suicide, no matter how you look at it. For a mile of railroad travel may very well mean the safe transportation of a thousand or more passengers, while a mile of air travel rarely accounts for more than half a dozen. So there is not as much comfort as there might be in these averages, and perhaps we had better go back to our comparison between aviation and sitting on a boiler.

Perhaps we had better admit that riding in an airplane is still a relatively risky thing to do. I doubt we have much to gain at this point in aviation history by insisting that an airplane is as safe as a bathtub, though the casualty rate per mile in bathtubs is probably much higher than that of airplanes. We cannot keep on insisting that there is nothing the matter with aerial transportation except that the

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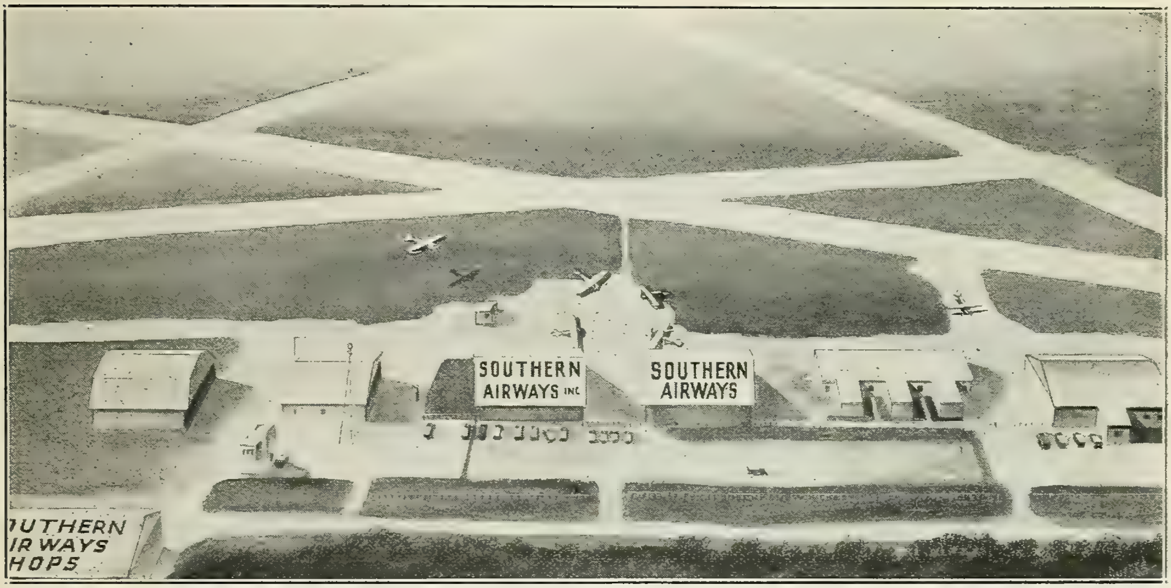

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public has cold feet and won't try it. People do get smashed up in airplanes. Too many people. And something should be done about it.

In spite of my friendly remarks about gliders, I don't suppose that the remedy for the air risk is to leave the motor off the airplane. Nor do I doubt that the designers and manufacturers are working at the safety problem with all the zeal that is in them. If I have any notion on the subject, it is that we stand in need at present of better regulation of air traffic, particularly within State lines where the Department of Commerce has only a sketchy sort of control. We need enforcement, which is something you may have heard about in another connection. The D. of C. has done its best to lay down a law which is reasonable, adequate and good for the industry. It has invited the industry to coöperate, and the States to make statutes and regulations in line with its recommendations. Some have done so and some haven't. Some have made a bad joke out of the whole business by making this an excuse for a new department, with lots of nice jobs for deserving politicians and as little real air sense as possible. Some have postponed their share in air regulation, on the supposition that everything has been attended to by the Department of Commerce.

Everybody who knows anything about the matter, knows that interstate traffic is under pretty good control and management and has consequently been remarkably free from accidents. On the other hand, the local situation is not nearly as much improved as it should be. We still have hedge-hoppers and stunting amateurs; we still have tramps and crates; we still have fake schools and catch-penny operators. And until local legislation backs up the Department, there's not much can be done about it, except sweep up the pieces occasionally and lie like gentlemen about the safety of aviation. The States should get busy. And they should do as they have done in Jersey, and invite the real flying men to help frame the law,—a law which recognizes the real dangers and appoints penalties for sins of flying which can and will be enforced.

Until this happens generally throughout the nation, the industry will be somewhat like a glider trying to negotiate the hot-air currents above the Senate Chamber during a tariff hearing. It will be both bounced and boosted, favored here and thwarted there, encouraged to safe and sane operation in one place and elsewhere bedeviled by unfair and unhealthy competition. The air law of these United States must be made somehow to look like a uniform fabric and less like a patchwork quilt. For we have reached the point where the risks of aviation do not lie so much in uncertainties of design or performance in the planes themselves, but in the fool things which men will do with them. Which is just the point where the law must step in, if the public is ever to take us as seriously as we take ourselves.

THE NEXT TEN YEARS OF FLYING

(*Continued from page* 59)

Department started its own air mail service, without which we never would have had a start on air transportation. As this rolled along a bit farther, the Department of Commerce took up the general subject of aviation; and under Assistant Secretary William P. MacCracken, we had a great leadership in taking hold of such serious problems as the licensing of competent pilots and airworthy planes. The Department of Commerce has also undertaken to provide an adequate weather reporting system, and has done

(*Continued on next page*)

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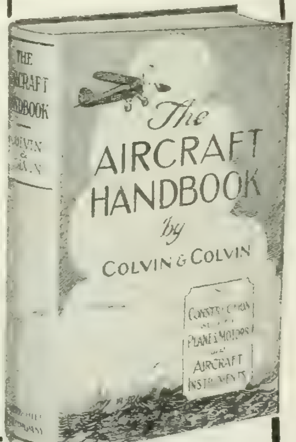

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"The aeronautical industry has now reached the point where we are ready to serve the business community. The public has given us substantial backing at Washington, and plenty of money with which to build planes and start transport enterprises; but as a whole the public has not yet said to itself, 'Now, I am going to fly.' And without that this whole business is going to have a slow and dragging period ahead of it. The only way, perhaps, that I can bring this question of personal flying home to the public is to cite my own personal experience.

"I have been flying for ten years, but I have never asked people in general to start in and fly until now. Last year I put my plane in commission in the early part of June and have been approximately 12,000 miles in that plane—not for the fun of flying, but for the purpose of saving time in going somewhere either for recreation or for business.

"I left New York at a quarter of three one afternoon, for example, and landed on Saratoga Lake in about an hour and forty-five minutes, took a taxi to the race track, bet on the fifth and sixth races, and won both bets. I had a very pleasant evening at Saratoga with friends; and the following morning I flew up to the upper St. Regis Lakes in the Adirondacks, landed on a little lake in front of the cottage of my father and mother, and spent Saturday afternoon and evening with them. Sunday morning I took off from the lake, landed at Oyster Bay for lunch, played tennis and had a nice swim before going back to work on the following Monday morning. That would have been utterly and completely impossible without the airplane. This Sunday morning I fox-hunted in Warrenton, Virginia, had lunch, took my plane and dined with my family in New York—which would have been out of the question without an airplane.

"I have frequently left my office on Broad Street on the lower end of Manhattan Island, had a motor boat put me in the plane at the tip of the Battery, and been on a tennis court playing tennis in thirty-five minutes. Without the airplane I could have done my business, but I could not have had my exercise.

"After luncheon today, I am going to Cleveland by airplane. Without the airplane, it would mean another day away from my business in New York to keep this business appointment in Cleveland. Some people may say, 'Well, he is reckless, or he is courageous, or he is not afraid to fly,' or however one may put it. But at least we are all fearsome for the members of our families. My daughter is seventeen years old. She owns her own plane and has a

(*Continued on next page*)

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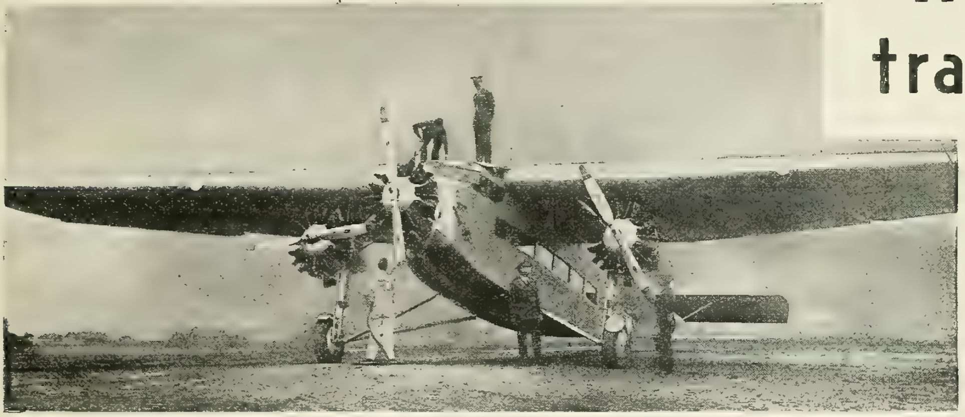

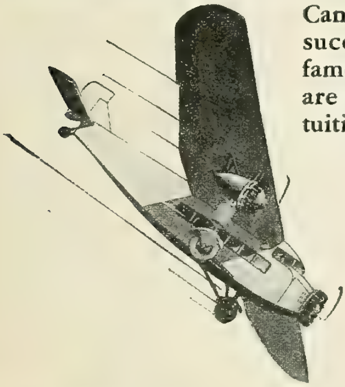

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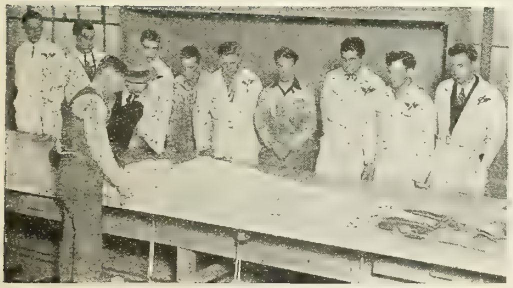

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A.D. 3-30

(Continued from preceding page)

Federal license to fly it. She has had both her grandmother, aged seventy, and her little brother, aged seven, flying with her alone. That's what I want to impress upon the public, that the present airplane is a sound and useful and profitable thing for everybody to take personally, and not merely in the abstract.

"We have now reached the point where we must say to people, 'Come on and fly yourselves.' That is the one thought I would like to see distributed over this country by all who believe that we have this enterprise in hand and are ready to serve the community.

"A very large part of the cost of inaugurating an air route is devoted the ground organization. A good flying field in a center of population costs at least a million dollars, which is a big capital outlay. You must have an executive organization; you must have mechanics available to take care of the planes; you must have a traffic organization to sell tickets. Under present conditions, the actual flying of the plane is the smallest part of the bill; but the only way we can convert it into the greatest part of our bill is to put more airplanes in the air as against our ground facilities, which are adequate today to take care of ten to twenty times the volume of traffic that goes in and out of these airports.

"In other words, the operating cost in the air, provided our ground facilities do not swamp us, will enable us to give the public reasonably cheap air transportation. But until we can convince the individual that flying is a personal thing for him to use today, we cannot go very much farther."

Now let's fly up to Bridgeport, Connecticut, and talk to Igor I. Sikorsky, of the Sikorsky Aviation Corporation. He has been building aircraft ever since 1910 when he completed his studies at Kieff Polytechnical Institute in Russia. During the war, he built seventy-three military planes for the Russian government and many more for the French government. A year after the war, he came to the United States and built his famous S-29 literally in his own back yard, housing his tools and engines in an empty chicken coop. This plane carried fourteen passengers, flew over 500,000 miles, and once transported two grand pianos from New York to Washington. Says he:

"I believe twenty or thirty-passenger planes are the minimum size practical for regular airlines of the future—the chief reason being the growing requirements for safety and the fact that undoubtedly in a short time every transport ship will be equipped with wireless and all the necessary instruments for fog flying and fog landing. I believe that the demand for reliability and comfort is increasing consistently and is rapidly leading to planes with four motors and a total horsepower of 1,500 to 2,500. More than four engines appear to be unnecessary, merely increasing the complications that may arise from a greater number of power units.

"At the present time the great German plane, the Dornier Do.X, has twelve engines; but this is apparently because of the non-existence of large power units. Although four engines seem the full necessary equipment, that number also appears to be the fewest combining safety and comfort. Any further increase in the size of ships, I believe, will be merely an enlargement of the four-motored type to permit carrying more passengers or cargo.

"It is my firm belief that amphibions will some day be used almost entirely by private owners and air taxi drivers. On a thirty-mile strip between New York and Washing-

(Continued on next page)

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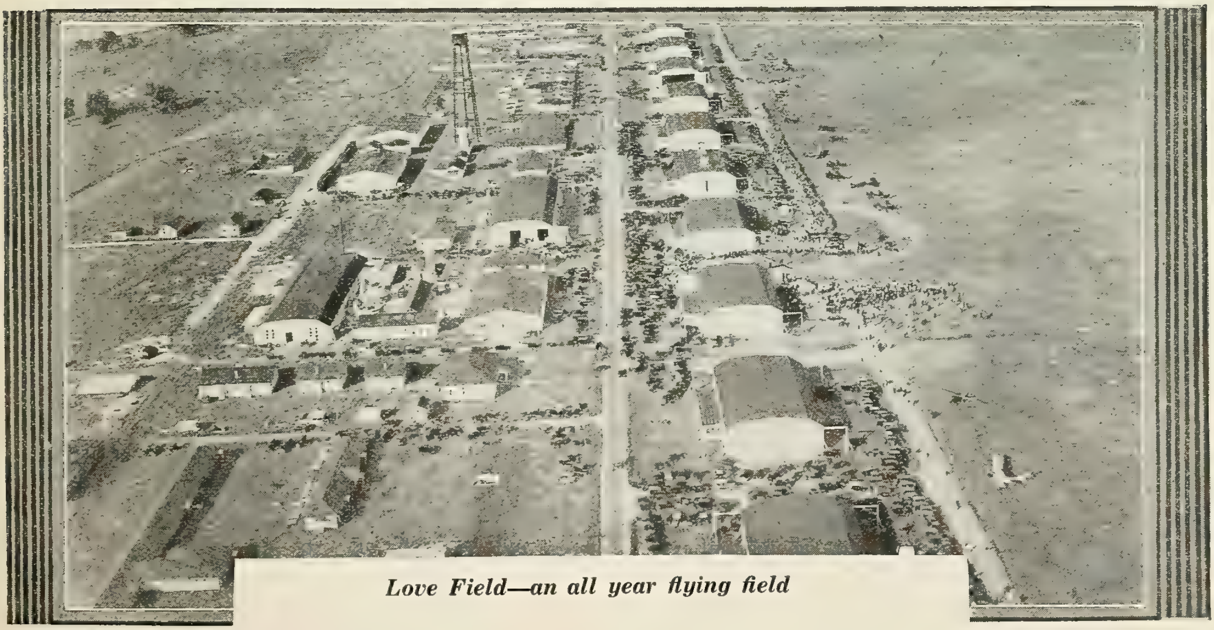

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DALLAS, TEXAS

(*Continued from preceding page*)

On a thirty-mile strip between New York and Washington, for example, there are seven and a half miles of emergency landing fields marked on the maps against 550 square miles for emergency water landings; and any number of such instances could be cited.

"In the future, over-water flying must be done entirely by seaplanes or amphibions. Landplanes should never be allowed to attempt to operate over long stretches of water, regardless of how many engines are provided. And so far as mixed routes are concerned—part land and water—where terminals may be at one end on land and at the other on water, the amphibion transport is undoubtedly the only proper equipment."

This compendium of flying prophecies would not be complete unless it contained the views of Graham B. Grosvenor, ex-cowboy and elevator mechanic. Starting as mechanic of the Otis Elevator Company way back in 1902, he literally elevated himself by sheer merit through one executive promotion after another, until now he is president of the Aviation Corporation—whose subsidiaries include the Fairchild Aviation Corporation, Colonial Airways Corporation, Alaskan Airways, Inc., Cuban Flying Service, Embry-Riddle Aviation Corporation, Interstate Airlines, Inc., Southern Air Transport, Inc., and Universal Aviation Corporation.

Says Mr. Grosvenor:

"The progress of the last ten years of aviation proves that to look ten years ahead and predict its status then, with any degree of accuracy, is a futile task. Few persons in 1920 would have conceded aviation the place it holds today. Experiments, plans, and studies now under way forecast things only dreamed of a few years ago. So fast has aviation moved, and so fast is it moving today, that ten years may see the development of projects which now seem highly improbable. This is the day for the scoffer to be careful in his scoffing.

"The next ten years will see the general acceptance of the airplane as a common means of transportation—with thousands of persons flying daily in larger craft and at speeds perhaps twice those of present-day transport planes. It is not unreasonable to believe that we will see the continent being crossed in twelve or thirteen hours in regular scheduled service.

"Much has been said of the construction of landing places above the buildings in the centers of large cities, on which transport planes would discharge their passengers several hundred feet in the air. It is possible that something like this may be attempted within the next few years. Many engineers discourage the idea, but many impossible things have been done in the past.

"Ten years from now, air express lines will be carrying large volumes of merchandise between all the important cities of the country—resulting in important changes in American business methods. Time saved by the employment of aerial express will mean not only reduced inventories but also much more rapid turnover of stocks.

"Development of great flying boats and progress being made in development of the dirigible, forecast regular scheduled trans-oceanic service within a few years, bringing Europe and the Orient within hours instead of days of our coasts. It is not unreasonable to believe that Europe and New York may be brought within twenty hours or less apart. Development of the flying boat is particularly interesting in this respect, for present experience indicates that such craft can carry far greater loads at much higher speeds than landplanes.

(*Continued on next page*)

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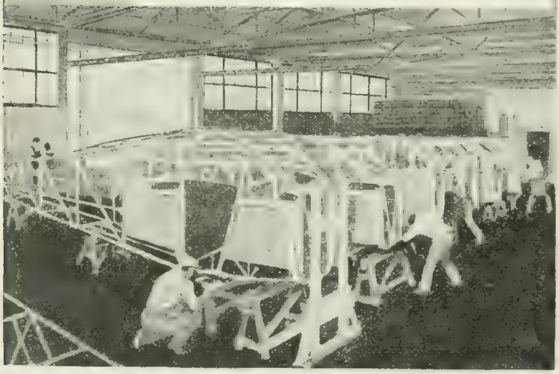

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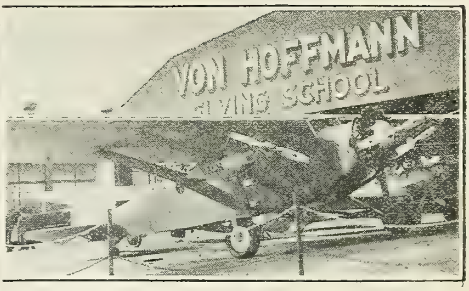

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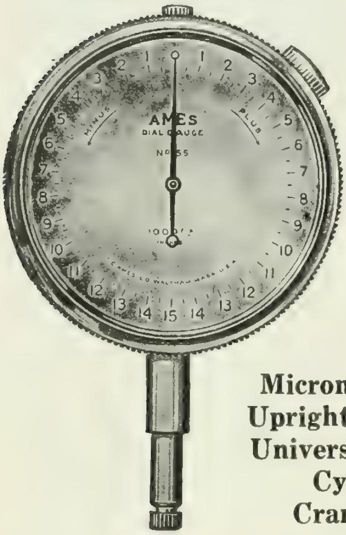

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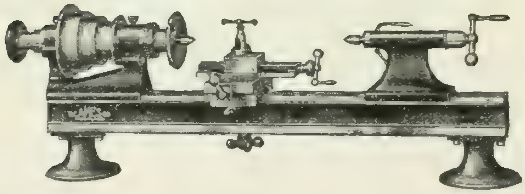

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(Continued from preceding page)

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"The various state governments undoubtedly will come to realize that their prosperity is as much linked with the airways as with the highways, and will join the Federal Government in giving the country a complete, connected system of well marked and maintained airways. Progress made by the Guggenheim Fund in the solution of the fog problem, together with future development of new instruments, gives promise that the weather—now a great stumbling block for aviation—will not affect air transportation to the extent it does today."

Last but by no means least, comes Anthony H. G. Fokker. If you don't know who he is, just ask any airplane pilot or mechanic the world over. Being in Europe looking after his airplane factories over there at the time this article was prepared, he could not be reached for an interview; but he was kind enough to dispatch the following cablegram:

"Statement for Clary as follows: Concentrate every effort on safety in operating...Develop engines and fuels ...Educate the public...Teach the young generation to fly ...And within ten years we will cross every country and ocean safely and speedily. Nothing can stop aviation from taking its dominating place in transportation. We will build the airplanes all right.—FOKKER."

RECONDITIONING ARMY AIRCRAFT

(Continued from page 70)

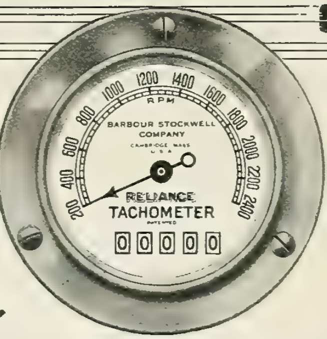
are made and the "bugs" removed.

When the engine has been checked as satisfactory, the empennage and wing surfaces are received from the racks and the airplane is rigged. Workmen in this section are so skilled and experienced that rigging is not often incorrect when done by sight. Although the work is checked with steel tape, errors are seldom found.

Upon leaving the final assembly hangar, the plane is checked by the inspector for aero repair and sent to the flying line. An officer designated as final inspector takes the plane aloft for a test flight. A few minor adjustments required for nearly all planes after this last test are handled by employees at the line. The finished plane, practically a new one, is then reported as being available and is placed in the storage hangar until orders are received for its placement.

The engineering section also includes a parachute repair unit now producing parachutes and testing equipment. Large especially constructed tables are used in this division. Stretched over these tables, the sections of the parachutes having damaged parts are replaced, and sewed on the repair sewing machines. It is on the walls of this department that the pictures of members of the famous Caterpillar Club hang.

The name Duncan Field commemorates an accomplished officer, Major Thomas Duncan, formerly air officer of the 90th Division, Organized Reserves. He was killed at Bolling Field, Washington, in 1923. While stationed at San Antonio, he did much to maintain interest in commercial as well as military aviation, and his service there is gratefully remembered.



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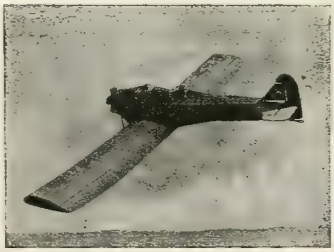

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INTERNATIONAL FLYING PROBLEMS

(*Continued from page* 71)

necessities for the operating phase will be forthcoming without delay.

Operating personnel, though an immediate problem, can be trained for the various duties involved. The element of time is the apparent essential. The captain of a large dirigible loaded with pasengers and merchandise assumes a definite responsibility, as does the captain of a large passenger liner. Doubtless the steamship companies encountered a similar situation in the early stages of their operations. They overcame it, and the air transport organizations will do likewise.

International Coöperation

AIRCRAFT require certificates of airworthiness; and airmen, certificates of competency. Different countries have varying requirements, which fact has to some extent presented complications. These differences are, however, gradually being adjusted satisfactorily. As previously stated, a number of European countries adopted what is referred to as the "International Convention of 1919." Some of the South American countries also became parties to it. The United States participated in the deliberations preliminary to its adoption but did not ratify it or become adherents, for a variety of reasons, which seem adequate. The Convention has been of assistance in the development of international air transportation in Europe, because, among other things, it sets up certain uniform requirements and regulations.

In 1926 a Pan American Conference was held in Washington. It dealt with general matters, but specific reference was made to aviation, with the result that a preliminary "Pan American Convention" was formulated. This included a substantial portion of the forty-two articles of the International Convention of 1919, but was sufficiently modified to be more readily adaptable to current and anticipated operating conditions and customs in the Pan American countries. In 1928 another Pan American Conference was held in Havana where the Convention was signed by the various delegates, and it is now subject to ratification by the various countries involved.

More recently—June, 1929—an extraordinary session of the International Convention was held in Paris. Its apparent purpose was to discuss changes in some of the existing provisions, removing certain phases which had not been unanimously acceptable, and thus eliminate the necessity for other conventions or agreements, such as the Pan American Convention.

The point to be made is that there is need for complete international accord in the matter of aircraft operation for commercial purposes, as well as for uniformity in rules and regulations pertaining to that operation. Until such time as this is accomplished, various countries will doubtless continue to effect individual reciprocal agreements much the same as the United States and Canada. However, as previously indicated, an immense amount of effort has been put forth in an attempt to reconcile the various existing requirements, and an agreement which can be made universally acceptable seems now more nearly a possibility than ever before. Naturally it will provide for such matters as airworthiness requirements, customs, entry and clearance, and other related items.

The Economics Involved

THE subject of operating costs and the necessary rates for suitable revenue production is an exceedingly difficult one to discuss. There is a lack of sufficient ex-

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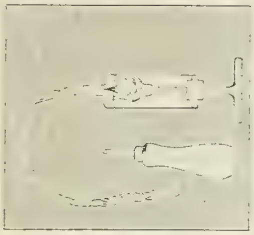

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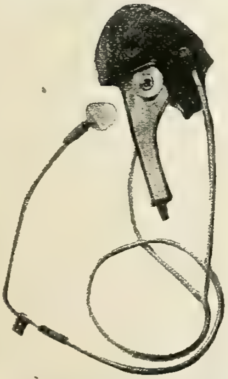

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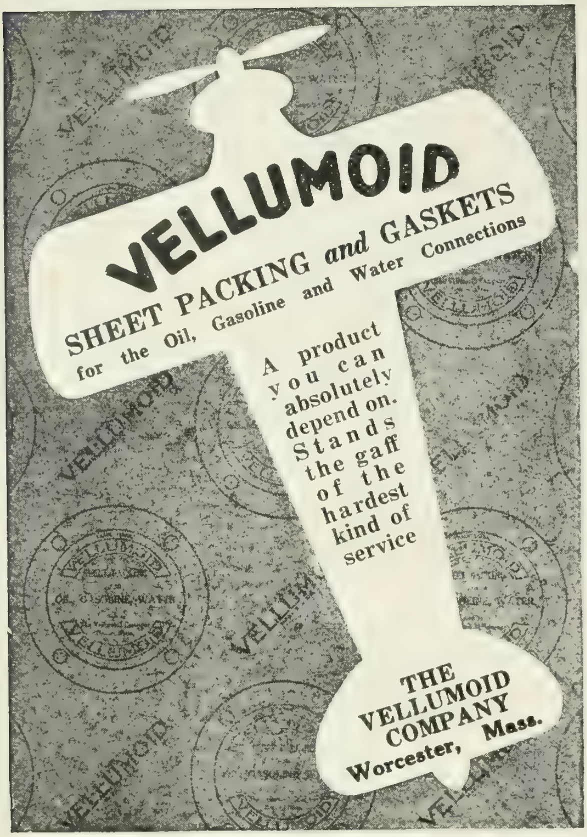
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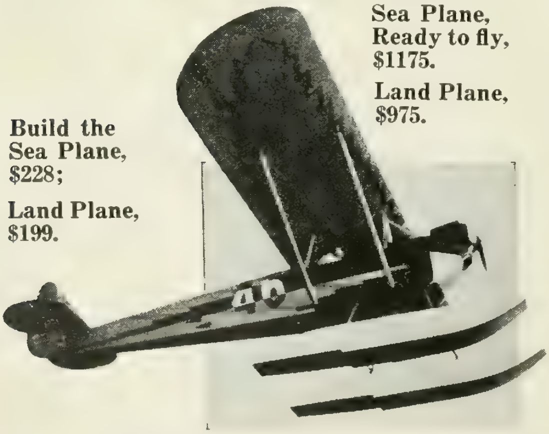

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(Continued from preceding page)

perience upon which to premise an intelligent opinion. To discuss the problem is to bring up the oft repeated question of whether or not air transport will always be more expensive than the ordinary forms of surface transportation. The answer depends entirely upon how one calculates it, and what relative values are assigned. Per mile, it doubtless will cost considerably more; but per hour of travel time, it should prove to be decidedly less. Therefore, because time is one of the most essential elements in our daily lives, it would seem that air travel should without difficulty find its place in the economic scheme of things.

As to the general proposition, some fundamentals suggest themselves. Transportation always has been, and always will be, indispensable to industry and commerce. The latter have progressed in direct proportion to developments and improvements in the former. Air transportation offers a medium of movement unequaled in speed or directness of routes by any existing or known transport system. It is proving itself to be amenable to the age old laws of economics. Design and development of aircraft, ground facilities, instruments, equipment, etc., are rapidly removing any peculiar hazards, thus extending the sphere of usefulness and increasing safety and reliability. Business and commerce are definitely taking advantage of the improved transportation facility which is being made available. The cycle of progress will surely be applied in the case of air transport as it has been in other forms of transportation.

I have referred to only a few things which present themselves as difficulties in world-wide, international air transportation. There are others. Perhaps many of them. The same complexity has, however, been true in any other form of transportation and in most new industrial undertakings. The difficulties have been overcome. They will be in air transportation, whether interstate or international.

Paper presented at the aeronautic meeting of the Society of Automotive Engineers, Miami, Fla., January, 1930.

GETTING DOWN TO EARTH

(Continued from page 77)

co-workers that atmosphere which would sustain an airplane in flight must be capable of sustaining a parachute, he proposed to dive out of a plane four miles up.

Sergeant Madan was his pilot, and the ship they selected was a Le Pere biplane, an open-cockpit job. Of course, all the engineers were out to see them start off. The ship climbed speedily and was soon lost to sight, though the sky was clear and the ceiling high.

Bottriel planned to dive out at 21,000 feet, and when the altimeter showed 20,500 feet, he made ready for the jump. He arose in the cockpit, intending to make a last minute examination of the parachute pack. It was bitterly cold up there. Perhaps he moved clumsily. Perhaps he accidentally released the 'chute himself. The rip-cord might even have snagged on the throttle.

Whatever the cause, the pack suddenly spilled open, was drawn down through and out of the fuselage near the tail post, carrying Bottriel with it. Although injured by his peculiar exit from the plane, he made a safe landing about sixteen miles from McCook Field.

Captain A. W. Stevens, of the Photographic Section, some time later undertook to outdo this jump. Proposing to surpass Bottriel's record by 5,000 feet, he persuaded Lieut. Leigh Wade to pilot him aloft in a DH. After the ship had reached an altitude of more than 26,000 feet,

(Continued on next page)

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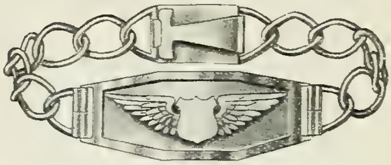

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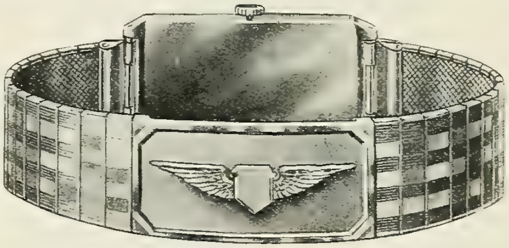

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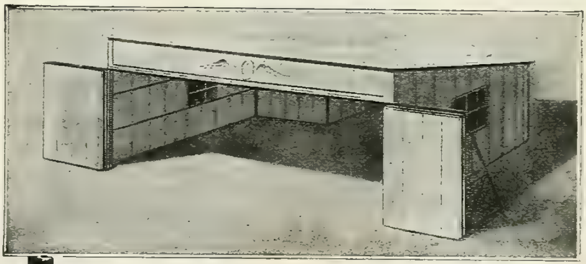

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(*Continued from preceding page*)

Captain Stevens jumped. In the rare atmosphere at that height, his descent was rapid; he lost his oxygen bottle and had to fight off unconsciousness, but withal landed safely with no greater injury than a cracked ankle.

This jump of Captain Stevens, incidentally, still stands as the world's altitude record for a parachute jump. For reasons not difficult to understand, the host of record-breakers have not been eager to break it.

About the same time, Sergeant Bose at Mitchel Field undertook to put the quietus on the honored theory that a protracted fall in space brings unconsciousness. No doubt you believed it yourself. Haven't you heard people say, "Well, he never knew what hit him. He had passed out before he hit the ground."

A merciful theory for aviators, but utterly absurd

Diving out of a ship, 4,500 feet above Mitchel Field, Bose fell 1,500 feet before touching the rip-cord ring.

"Nothing wrong with that, was there?" he demanded, when he landed. "My brain worked okay."

Slowly this range was boosted. Then Harold Whitby, a Navy jumper, broke the back of all doubt. I found Whitby at Russell's factory, and so had the story from his own lips.

Three of them took off, each planning to go the limit—to fall as long as he dared before opening his 'chute. Whitby was the last. Morgan, who had preceded him, fell uninterruptedly for 3,000 feet. Whitby, stocky, black-haired and determined, vowed he would beat the record.

At 5,100 feet he went over the side of a Navy bomber. He fell with the awful directness of a plummet. Three times his body turned perfect loops. It rolled flatly and spun head-down. The pressure of air in his ears dulled his hearing, became an ingratiating whine. And the earth came rushing up to meet him with disturbing alacrity.

"At 5,000 feet," Whitby said, "the grass seemed gray and flat. I could hardly pick out the buildings on the field. But all that changed swiftly enough. Buildings seemed to blurt out of nothingness. And then, when I made my last turn, and saw how green the grass had become, and how near, I decided I was near the end of my rope. I yanked the rip-cord."

The 'chute cracked open with a violence heard three miles away. It set up such a counter-resistance that he was actually whipped back into the canopy. But he came down on his feet, with only a few black and blue marks to show for his experience! It was over in thirty-one seconds.

That jump by Whitby apparently put that theory among yesterday's silly fancies. Since that time many jumpers have made much longer delayed openings.

"I remember the surprise occasioned when Lieutenant Fairchild, chief of the McCook Field Flying Section, saved his life," Russell related. "Incidentally, he was one of the first in American aviation to make a successful parachute jump from a disabled aircraft. The new 'chutes we designed had been in service for some time, but pilots for the most part were inclined to look upon them as excess baggage.

"Fairchild was flying an experimental ship, all dolled up with a new kind of ailerons. At 2,500 feet, he put them through a lot of stuff and immediately got into trouble. The ship began to vibrate horribly, control was lost, and it began to fall to pieces. Rather unpleasant at 150 miles an hour speed.

"Fairchild remembered his parachute, and bailed out. He had an agonizing experience. Not realizing he was falling upside-down, he kept snatching at his leg-strap

(*Continued on next page*)

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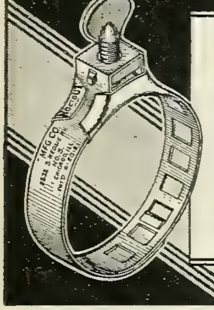

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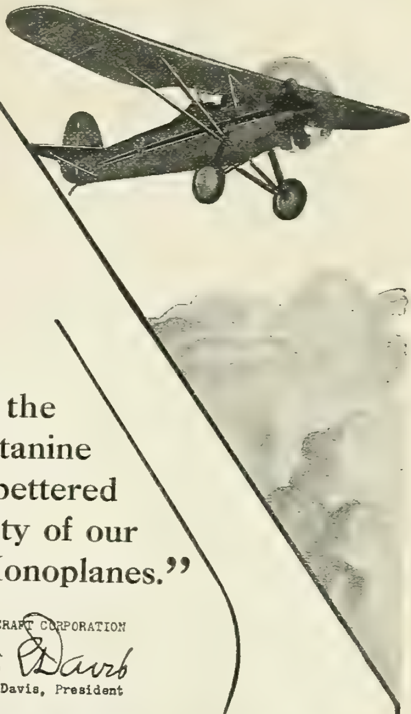

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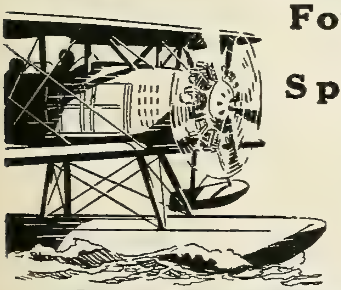

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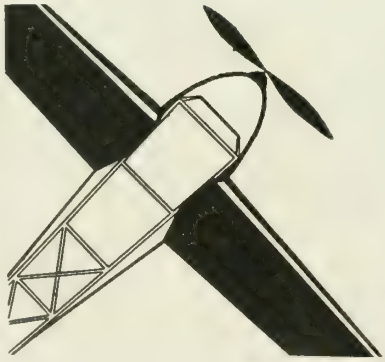

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(*Continued from preceding page*)

buckle, believing it to be the rip-cord ring, which was under his arm-pit. Finally he got it and pulled hard. The 'chute landed him safely. No one was more pleasantly surprised than he. Look at his report!"

Russell reached into his desk and drew forth a bit of paper.

"An interesting feature of the descent," Lieutenant Fairchild wrote, "was the fact that mental faculties were perfectly active, and perfect control was maintained of the arms and legs despite the probable rapidity of the descent. No feeling of relief occurred when the parachute opened. No conscious fear was felt at any time during the accident or the descent.

"This point seemed simply to be another interesting phenomenon of the descent."

The "Caterpillar Club" grew rapidly enough, after the first emergency jumps. Flight testing an MB-3A airplane at Seattle, Lieutenant Tyndall was chagrined—not to say discomfited—to observe that after a violent roll his wings had not only detached themselves from the fuselage, but were at that moment floating half a mile behind. He dived out, and the parachute saved his life.

Lieutenant Barksdale was hurled from a ship that started to fall to pieces under him, dropped his life overboard and parachuted to earth. Lieutenant White's ship collided with another over Kelly Field and he got free the same way. One brisk, cold night, Lieutenant Macready bailed out of a stalled plane over Dayton and floated down through the murk, yelling, "Look out below." He almost landed in the laps of a party supping on the lawn, who welcomed the casual wayfarer by pulling him down from the tree in which he was entangled.

There is the makings of a whole saga in the many forced jumps that followed these. Under all kinds of conditions—at night, in fog, in good weather and storm, when ships started to go to pieces and motors cut out—wise pilots jumped hastily into membership of the Caterpillar Club. Dirty weather of the mail route contributed its share of pilots thus living, as they put it, on "borrowed time." Flight testing new ships for experimental purposes contributed still more.

Meanwhile, even since those days at McCook Field, the parachute itself has been strikingly improved. Resigning from the Army to devote himself to developing a parachute for commercial purposes, Russell brought forth a new type, called the Russell "Lobe," which has further added to the parachute art. It derives its name from the shape of the canopy. Where other types are flat-shaped, this 'chute, which is now being used by many of the major transport companies in the country, is a striking lobe, automatically balanced.

Its invention is one of the curious by-products that so often come from a distressing experience. One trouble with the early type of 'chute was its tendency to oscillate. Cracked ankles and limbs were the penalty of an injudicious descent. The hapless parachutist was sometimes flung to and fro in his harness.

"I got mine," Russell recalled ruefully, "when I made a jump before General Billy Mitchell, ostensibly to demonstrate this parachute we had developed at McCook. I came down nicely enough, but a chance gust of wind blew me across the field and almost drove me into a hangar.

"Just before I touched the ground, the 'chute oscillated, swung me up five feet or so, and then let me drop. I cracked my ankle in seven places."

(*Continued on next page*)

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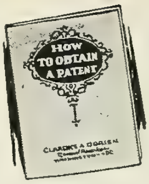

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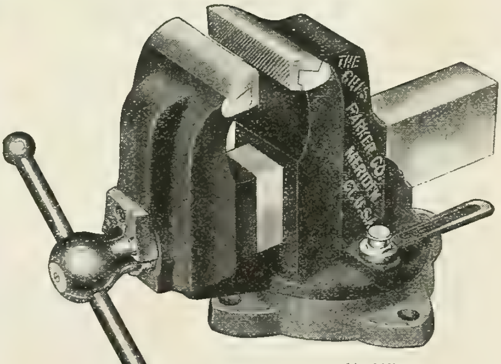

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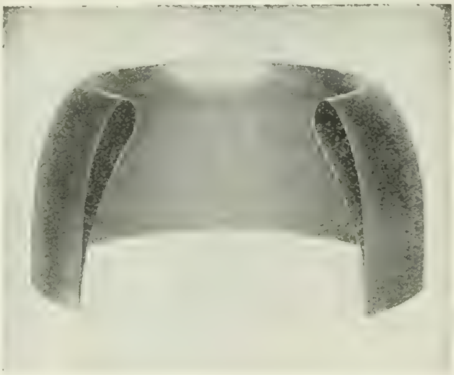

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(Continued from preceding page)

Six years later he learned how to dampen that motion.

"It was absolutely necessary," he argued, "if we expected the public to take kindly to the use of parachutes. The modern parachute is a real aerial life-preserver. We have succeeded in slowing down the rate of fall from twenty-two feet to fourteen feet per second. The shock on landing is equivalent only to a six-foot fall.

"Of course we could lessen even that by using a larger 'chute, but the chances of injury are so slight that this would be economically unwise. It would take up too much room. The average 'chute in service in commercial flying is twenty-eight feet in diameter, whereas the emergency pack used by Army and Navy fliers is only twenty-four feet. This lets them down a little bit faster, but quite as safely.

"Do you imagine," I asked, rather stupidly no doubt, "that passengers will be afraid to use them? Do you not think that they would rather stick to the plane rather than chance a jump?"

"Hardly," Russell answered. "Few people like to swim in the middle of the ocean, but do you hear of any one refusing either a life-preserver or a life boat when the cry comes: 'Abandon ship.' No, people will take that avenue that promises safety. Most of the pilots who are in the Caterpillar Club never made a jump before their own emergencies.

"A jump is a simple matter. That idea of counting 'three' before you pull the rip-cord has long since been abandoned. You simply wait until you are clear of the craft before you pull the rip-cord, thereby preventing the possibility of the 'chute's becoming entangled in the tail surfaces.

"I imagine the time will come when parachute instruction will be given every one who flies. Many companies are doing it today."

Still, it is Russell's fervent theory that plane 'chutes are the next step. Instead of having passengers abandon these huge aerial liners in a mass, he believes the ship itself will be lowered by a parachute. He has already taken the lead in this sort of thing, having successfuly lowered two small planes on the West Coast, with no other damage than cracked landing gears.

"It is not an insoluble problem," he said. "An eighty-foot 'chute would safely lower the biggest plane in use in this country today. It would be packed in the tail, taking up no more than two square feet of space. Supporting cables would run over the fuselage to the center of gravity, two-thirds of the distance from the entering edge of the wing, where the 'chute would be anchored.

"The device would operate by levers. Suppose the engines failed, or the ship exhausted its fuel in fog. The pilot need only pull the lever, and the 'chute would swing into position. Of course, the undercarriage would be braced against vertical shock, but even this would not be great.

"Using a fifty-foot 'chute, I lowered a 6,000-pound airplane at a rate of twenty feet a second, and with a larger 'chute the transport plane would fall at no greater speed. The passengers would hardly feel the shock. It is inevitable, I believe, that aviation will adopt the plane 'chute.

"Not only will its use diminish passenger hazards, but it will also salvage the plane itself. It would dispense with the need and extra weight of individual parachutes, and it would insure the salvage of an $80,000 airplane.

"Yes, as time goes on, you will hear a lot about parachutes."

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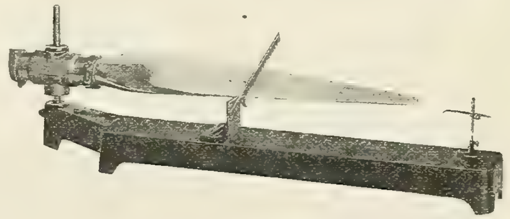

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(Continued from page 65)

directly the amount and direction the plane deflects from the horizantal position, whether it be a bank or climbing angle, or a combination of both climb and bank. In other words, the exact attitude of the plane in relation to the earth is shown at a glance, whether it be a bank or a climb. The one feature which distinguishes this instrument from other "spinning tops" is that there is within the gyro itself a balancing device whereby the position of the center of gravity is automatically changed by the speed of rotation, and in such a way as to make the gyro function properly. Starting from any position, and driven by air similar to a wind shield wiper on an automobile, the gyro picks itself up and indicates the true vertical at all times, provided the bank does not exceed sixty-five or seventy degrees, beyond which the instrument fails to function.

While this instrument gives both climb and bank, it is still necessary for the pilot to observe this in addition to watching the compass and the air speed meter. As stated by W. E. Case, an experienced pilot with the West Coast Air Transport Company who has more than 2,300 flying hours time, "What we need for blind flying is an air speed meter to show the speed through the air; and a bank and turn indicator incorporated into one instrument, so we won't have to chase the instruments all over the board."

We propose the use of an instrument such as the Schenk climb and bank indicator, combined with a gyro turn indicator mounted directly behind climb and bank indicator, and with the air speed meter and the steering compass as close as possible to the combined instrument. This would make the task of a pilot more like that of a steersman aboard ship. There would then be less "chasing the instruments all over the board."

When more pilots are trained to do blind flying, the flying schedules will be followed more closely, flying will become more dependable, and thereby more popular. Also, as the public becomes more familiar with the general problems of blind flying, less fear will be evidenced, and again aviation will gain by the knowledge of the increasing factors of safety.

Leaving Seattle at a reasonable hour in the morning, and dropping down at Los Angeles the afternoon of the same day after an interesting, instructive and pleasant hop is a real saving in time and effort over surface transportation.

The writer wishes to acknowledge the generous coöperation received from the Boeing, Maddux, and West Coast Air Transport companies in making navigation tests.

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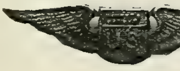

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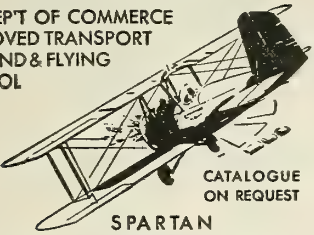

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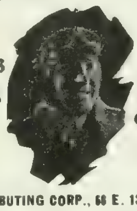

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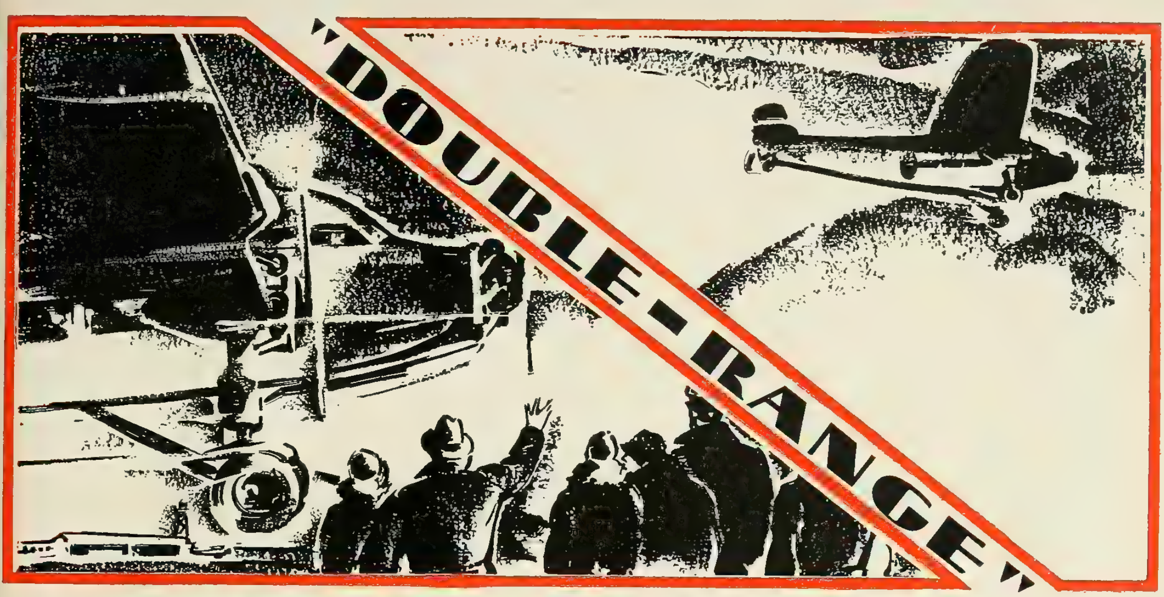

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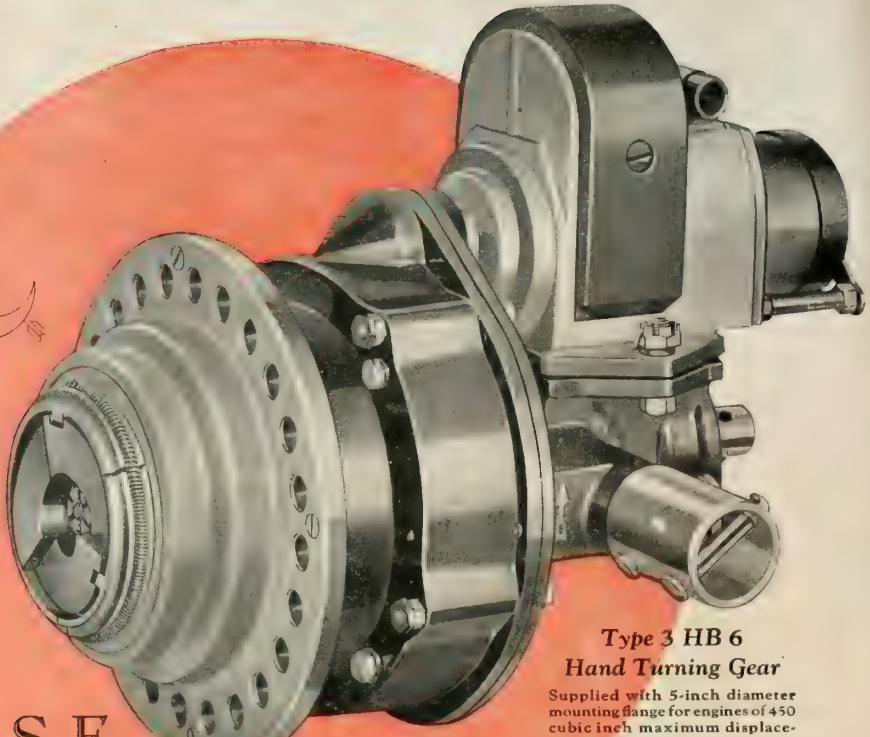

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All-American Aircraft Show, Detroit

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Aero Digest, April, 1930
Volume 16 Number 4

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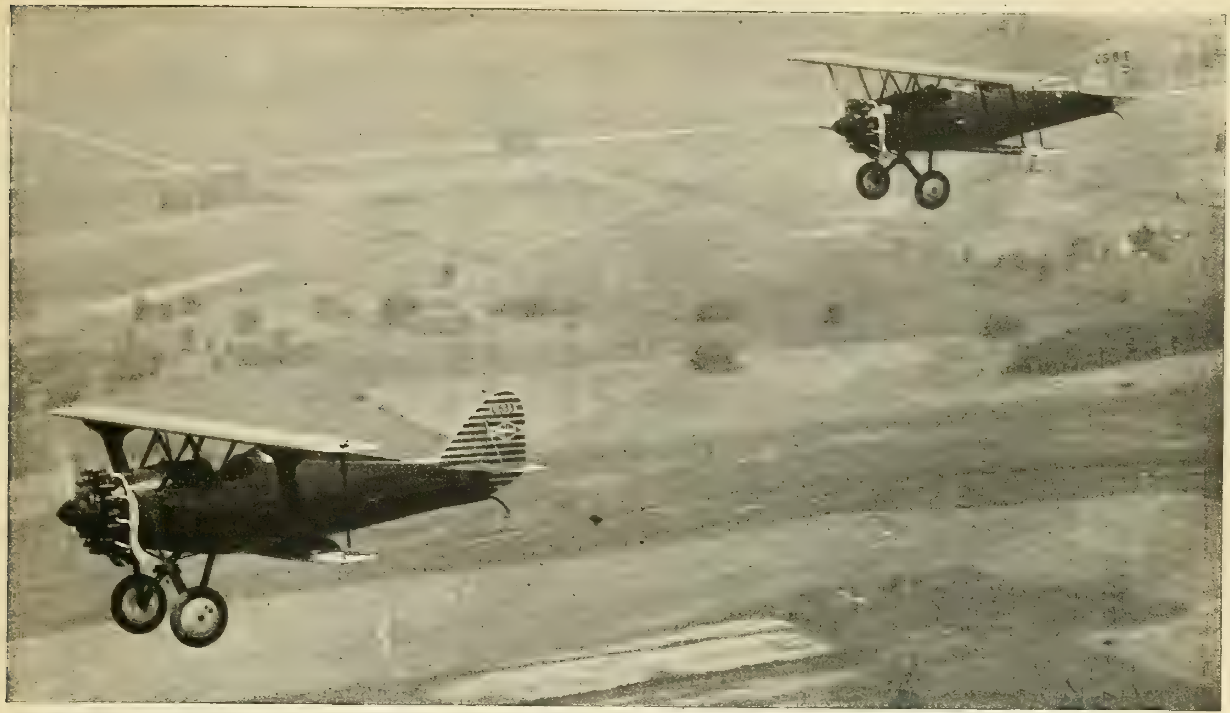

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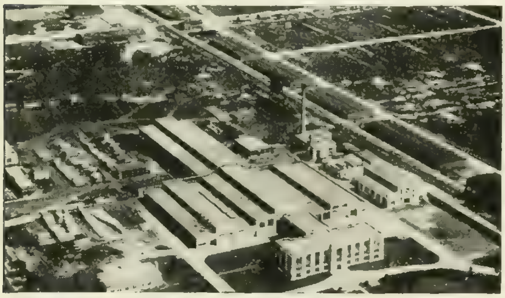

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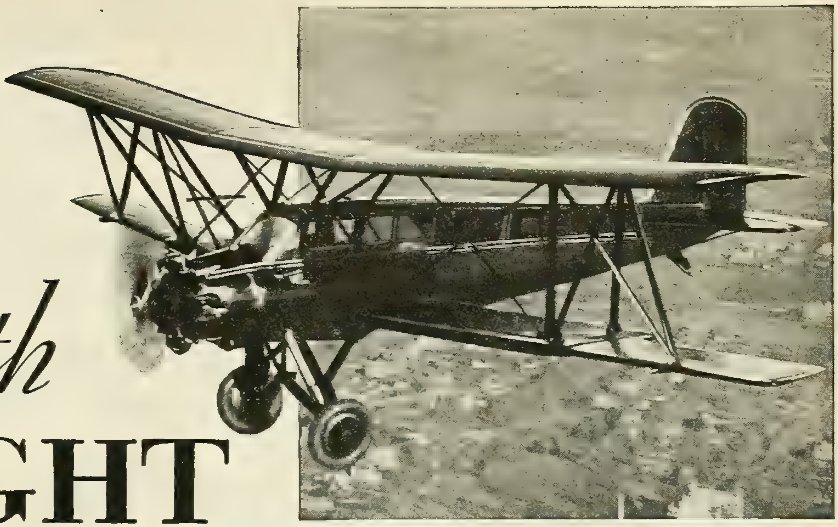

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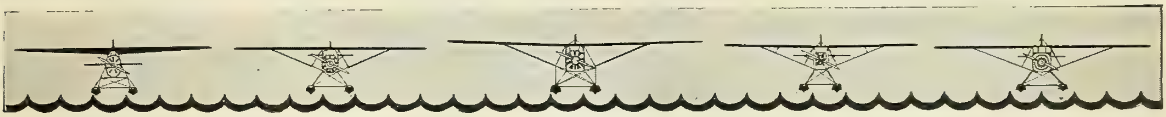

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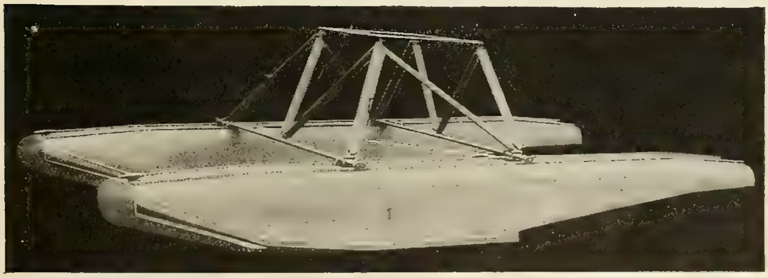

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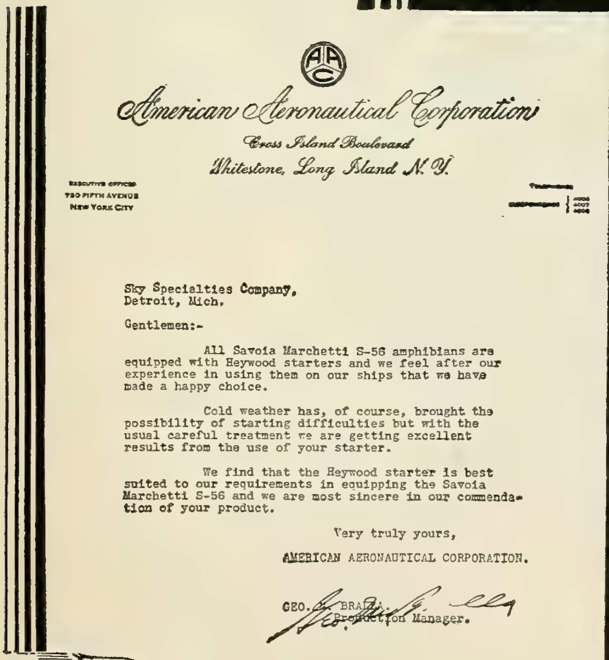

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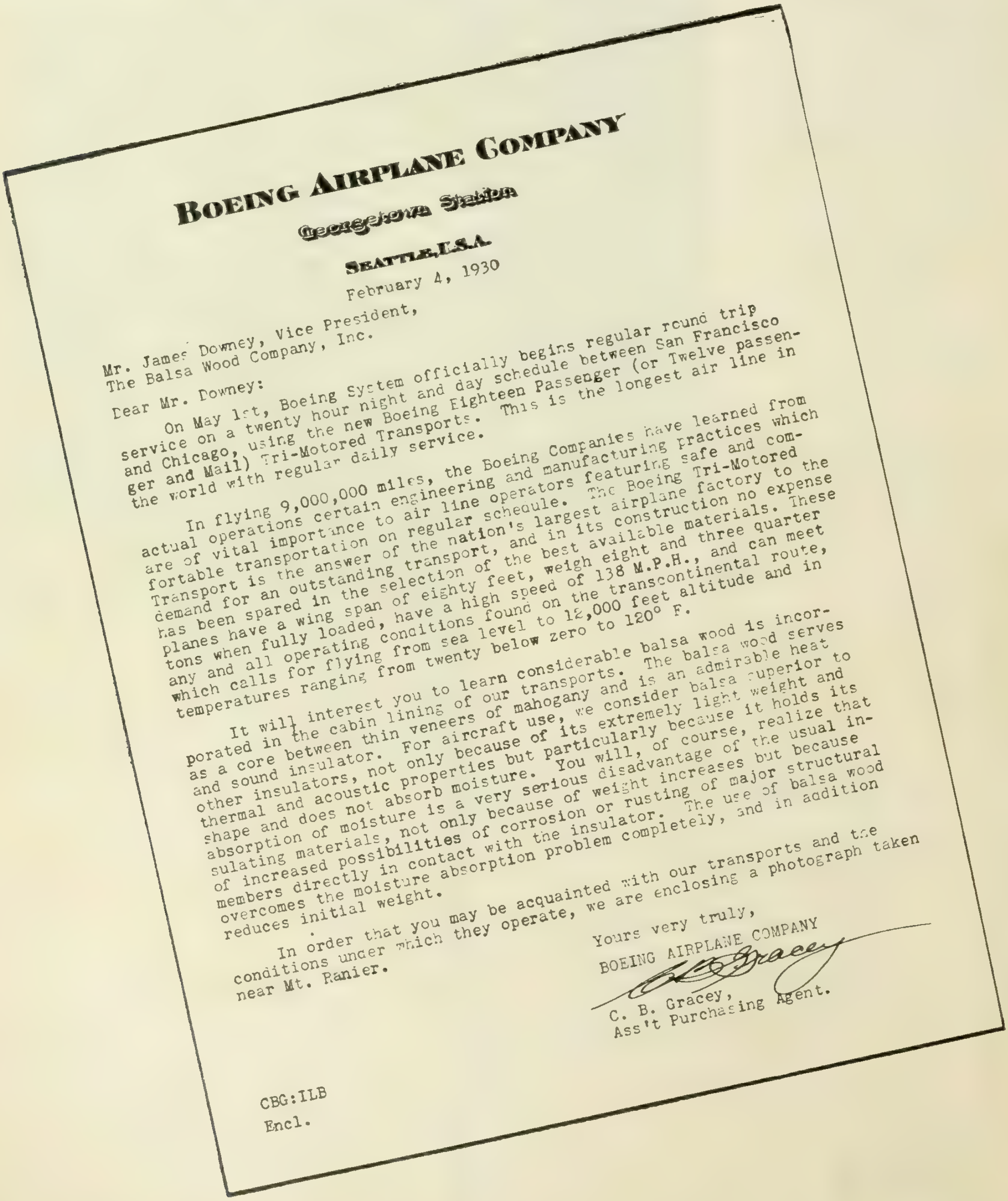

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SEATTLE, U.S.A.

February 4, 1930

Mr. James Downey, Vice President,
The Balsa Wood Company, Inc.

Dear Mr. Downey:

On May 1st, Boeing System officially begins regular round trip service on a twenty hour night and day schedule between San Francisco and Chicago, using the new Boeing Eighteen Passenger (or Twelve passenger and Mail) Tri-Motored Transports. This is the longest air line in the world with regular daily service.

In flying 9,000,000 miles, the Boeing Companies have learned from actual operations certain engineering and manufacturing practices which are of vital importance to air line operators featuring safe and comfortable transportation on regular schedule. The Boeing Tri-Motored Transport is the answer of the nation's largest airplane factory to the demand for an outstanding transport, and in its construction no expense has been spared in the selection of the best available materials. These planes have a wing span of eighty feet, weigh eight and three quarter tons when fully loaded, have a high speed of 138 M.P.H., and can meet any and all operating conditions found on the transcontinental route, which calls for flying from sea level to 12,000 feet altitude and in temperatures ranging from twenty below zero to 120° F.

It will interest you to learn considerable balsa wood is incorporated in the cabin lining of our transports. The balsa wood serves as a core between thin veneers of mahogany and is an admirable heat and sound insulator. For aircraft use, we consider balsa superior to other insulators, not only because of its extremely light weight and thermal and acoustic properties but particularly because it holds its shape and does not absorb moisture. You will, of course, realize that absorption of moisture is a very serious disadvantage of the usual insulating materials, not only because of weight increases but because of increased possibilities of corrosion or rusting of major structural members directly in contact with the insulator. The use of balsa wood overcomes the moisture absorption problem completely, and in addition reduces initial weight.

In order that you may be acquainted with our transports and the conditions under which they operate, we are enclosing a photograph taken near Mt. Ranier.

Yours very truly,
BOEING AIRPLANE COMPANY
C B Gracey
C. B. Gracey,
Ass't Purchasing Agent.

CBG:ILB
Encl.

All Balsa is not Lata Balsa. Lata Balsa is the only satisfactory heat treated wood.

LATA BALSA

LIGHT AS THE AIR

IS AN ADMIRABLE HEAT ...SUPERIOR TO OTHERS"

One of the Boeing 18 passenger tri-motor transports over Mt. Ranier. In its cabin shown at right, passengers are protected from changes of temperature and from the sound of the motors by panels of **Lata Balsa,** manufactured by the Haskelite Co. of Chicago. But one of the many instances where **Lata Balsa** has proved itself "an admirable heat and sound insulator." ¶ In addition you will find **Lata Balsa** very generally used as a remarkably efficient method of stream lining. ¶ For complete information write or phone The Balsa Wood Company, Pioneer and Imlay Streets, Brooklyn, New York.

LATA BALSA

LIGHT
AS
THE AIR

Specify Lata Balsa if you want the lightest of Balsa woods scientifically heat treated.

This Free Book .. is for the Man who says:

"I'd like to get into AVIATION .. *but* *I don't know how*"

IF

you are eighteen years of age or older, if you are serious enough about yourself and Aviation to train at home today for a better place tomorrow, then this book will interest you.

"At your direction, I got in touch with the Sikorsky Company at College Point. I have connected with them and want to thank you for your help." Paul J. W. Boehn, 47 Seventh Avenue, Brooklyn, N. Y.

"I have been taking flying instructions at the Pitcairn Airport. The instruction I received from you has meant an immense saving in time and money." S. Paul Rider, 1139 Huron Ave., Renovo, Pa.

Walter Hinton

was pilot of the famous NC-4, the very first plane to fly the Atlantic; he was the first Aviator to fly from North to South America; he was first to use a plane for exploration. During the war he was one of the Navy's crack flying instructors. Over 400,000 miles of flight under every conceivable condition, and over thirteen years of intensive aeronautical experience are behind his method of training.

TO some men Aviation means spirals, banks, loops, a rush of wings, a roar of motors, a challenge to red-blood.

To others it means booming factories, busy airports, expanding commerce, mounting sales, a challenge to ambition.

It does not matter WHY you are interested in Aviation—whether you think of it in terms of action in the air or action on the ground. It offers you an immediate opportunity and a big future. And Walter Hinton can help you realize both.

What is Walter Hinton's proposition? . . . It is three-fold:

First, Hinton puts you through a thorough course of training right at home, which completely covers Aviation's "ground-work." Flyers must have more than nerve and enthusiasm. Specialists in factories and at airports need more than determination and energy. *Everybody*, in *every* branch of Aviation, needs —and *must* have—*training.*

Second, Hinton backs up his course of study with a personalized, man-to-man service. He gives you special coaching on the subjects that are of particular interest to you.

Third, he helps you capitalize your training. If you want to fly, he directs you to a properly qualified flying school, and arranges for a reduction in your tuition. If you want a job, he puts you in touch with a prospective employer. If your present occupation is not what you would like it to be—if the future possibilities of your job fail to measure up to the future possibilities within yourself—if you are EIGHTEEN years of age or older —then Hinton wants to present YOU with a copy of his book, "Wings of Opportunity."

The cost of Hinton's course and service is small. The return in dollars and opportunity is practically unlimited. What Aviation wants today above everything else is men with the *right kind* of training. Aviation will want YOU once you have *that.*

Aviation Institute of U. S. A.
WALTER HINTON, President
1115 Connecticut Avenue, Washington, D. C.

Send to Washington

Aviation Institute of U. S. A., Walter Hinton, Pres. (402-F)
1115 Connecticut Avenue, Washington, D. C.
Kindly send me a FREE copy of your book, "Wings of Opportunity." I would like to get into Aviation.

Name.. *Age*..............
(Must be 18 or over)

Street..

City...*State*.....................

THIS IS AN AMPHIBION YEAR!

4

IRELAND MODELS

. . . $4,890 to $23,000

Never has any manufacturer provided a line of Amphibions so salable, with such tremendous potential profit for the dealer! A 2-place Flying Boat at only $4,890 . . . a 2-place Amphibion at $5,550, the lowest-priced amphibion ever produced . . . a new 4-place Amphibion at $18,000 . . . and the famous 5-place Ireland Amphibion at the new reduced price, $23,000!

Leading authorities agree that 1930 is an amphibion year . . . that three times as many amphibions will be sold this year, as last. And here, at last, is a *complete* line of Amphibions . . . at prices to suit almost every air-minded purse . . . prices that mean solid, substantial business and liberal profits for dealers who qualify for the Ireland Franchise.

Every cooperation is being given . . . cultivation of present markets and development of new ones . . . consistent, sales-inducing advertising, in magazines and direct by mail . . . a dealer policy, based on fair dealing and the highest standards of service, which assures mutual satisfaction and profit.

Established aircraft dealers of substantial financial standing are invited to communicate at once with Ireland Aircraft, Inc., Garden City, Long Island, New York.

IRELAND AMPHIBIONS

UNHEARD OF ECONOMY

WATCHFUL economy is imperative at present flying school rates. A 30% saving in hourly flying costs may easily insure the financial success of your school. Even though you have full equipment, there are money-making reasons why you should consider making the Aeromarine Klemm AKL-25 standard on your field.

For, with its unheard-of economy of operation (30% below that of the average training plane), go all the superior qualities of one of the world's most popular and successful light planes for training and for sport flying.

Born as a glider—the AKL-25 flies itself. Powered by the famous, dependable Salmson 40 horsepower, nine-cylinder radial—or by the equally well known, sturdy LeBlond 60 horsepower, five-cylinder, radial engine (*) . . . these planes are built to stand rough handling and to win friends for your school by their ease of control. Department of Commerce Approved Type Certificates Nos. 121, 203 and 204.

(*) For primary training, the AKL-25 powered by the Salmson 40 h.p. engine, sells for $3350, flyaway, Keyport, N. J.

For secondary training and for cross-country work, the AKL-60, powered by the LeBlond 60 h.p. engine, sells for $3500, flyaway, Keyport, N. J.

Equipped with pontoons and powered by the LeBlond engine, the AKL-60 sells for $4500, flyaway, Keyport, N. J.

AEROMARINE KLEMM CORPORATION

PARAMOUNT BLDG. · 44th STREET AND BROADWAY · NEW YORK CITY

Large new hangar of the Curtiss Flying Service at the Buffalo Airport. In circle, one of the meter pumps sunk in the runway.

When you "Give Her the Gun"

Mechanic fueling a Curtiss plane with Socony Aviation Gasoline

A STUDENT at the controls . . . Motor throttled down . . . He levels off too soon . . . Pulls back too quick . . . You know what may happen . . . You give her the gun . . . That's when you need a gasoline that takes hold . . . like Socony Aviation Gasoline.

Socony Aviation Gasoline has been selected as the official fuel for training ships used by students of the Curtiss Flying Service at Buffalo, just as it has been selected at many other large airports in New York and in New England.

The familiar Socony sign is a guarantee that the petroleum products sold are entirely dependable. Both Socony Aviation Gasoline and Socony Aircraft Oil are made to stand the severest flying tests.

SOCONY

Aviation Gasoline · Aircraft Oil

STANDARD OIL COMPANY OF NEW YORK

Two plus . . . . . two make Four!

FLOWN continuously since April 1926 . . . traveled a distance equal to more than ten times around the world . . . carried a total payload of 32,000,000 pieces of mail and express . . . never off schedule a minute . . . never once in the shop for structural repair nor part replacement . . . earned a gross revenue in excess of a half million dollars . . . *and still going strong!*

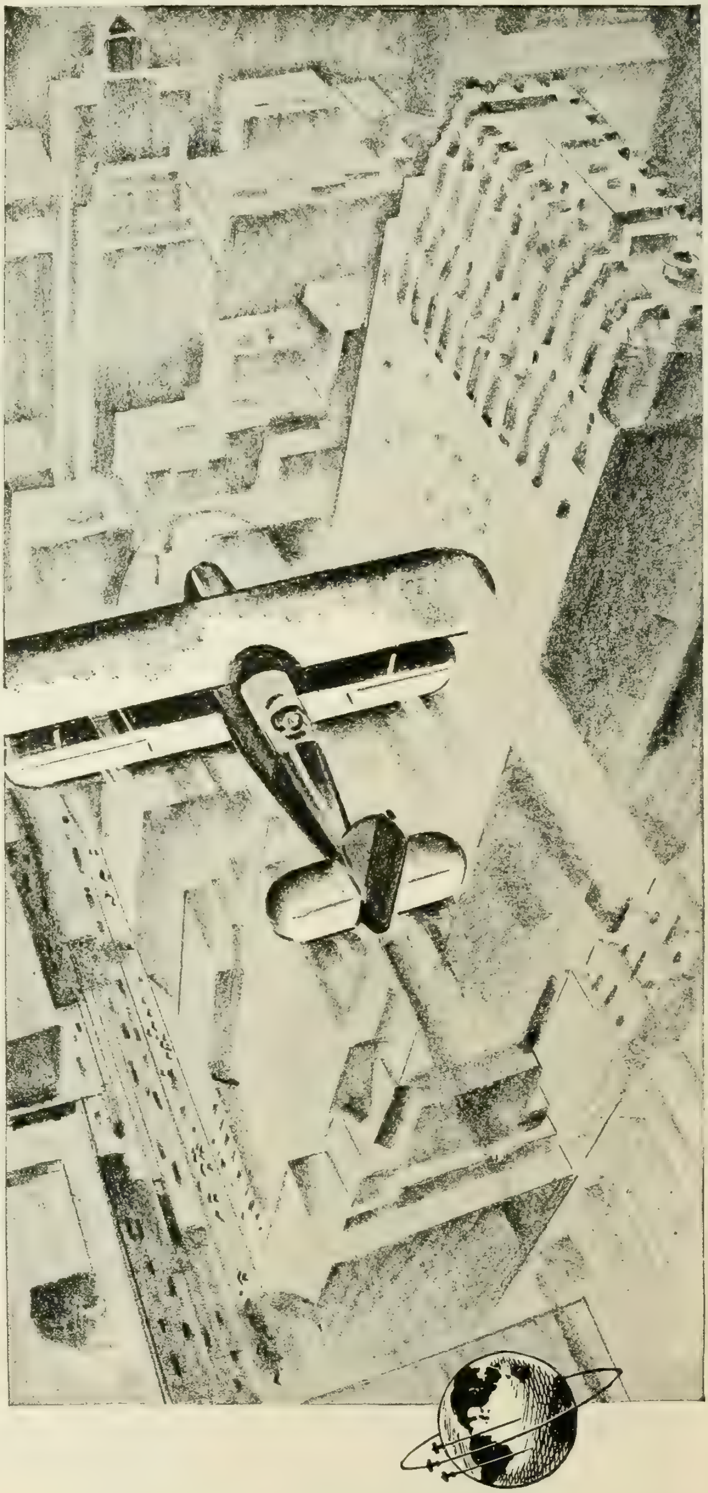
That is the record of Douglas Mail Plane Number 1, the first built by Douglas for Western Air Express, and flown on the Los Angeles-Salt Lake mail run.

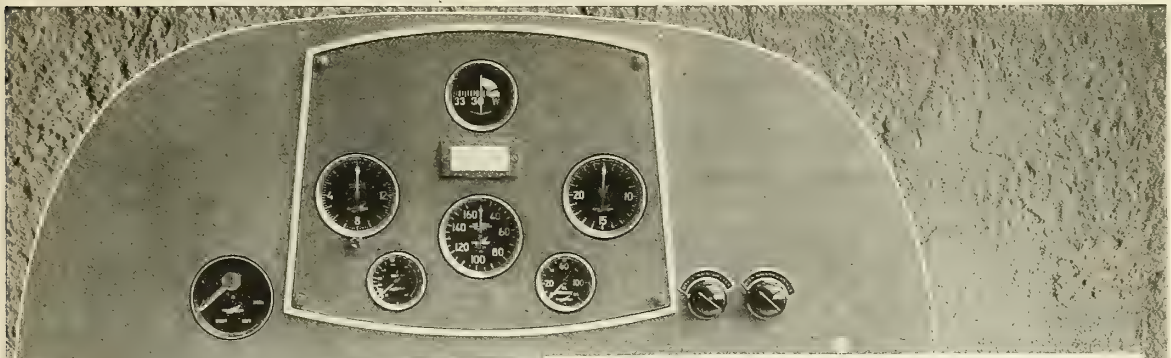
Since January 1, 1930, Douglas has received a volume of business equal to that received during any twelve month period preceding.

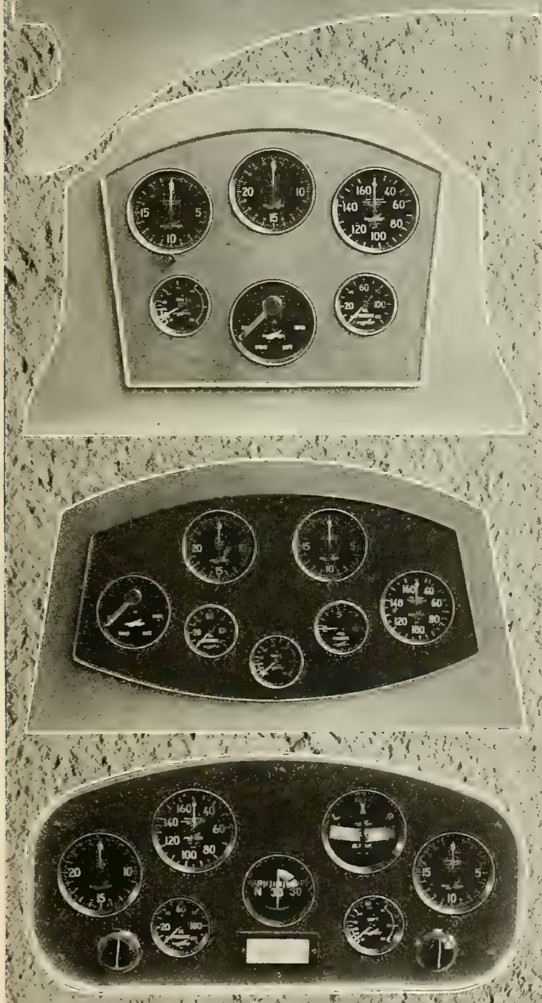
Facts speak for themselves. The record established by Douglas Number 1 is not an isolated case. Other Douglas planes are compiling records for equally outstanding performance, and because of this the demand for Douglas planes increases. Two and two still make four!

DOUGLAS
AIRCRAFT CO.
INCORPORATED
Santa Monica California

FIRST AROUND THE WORLD







AN INSTRUMENT panel should be pleasing to the eye, an ornament to the plane. For the instruments that are housed in the panel are the companions of the flier, holding unceasing communication with him by means of their moving pointers.

Consolidated instruments, are faithful companions, and friends, reliable in their service and accurate in the information they are constantly relating.

Consolidated panels that house Consolidated instruments, are of charming appearance in finish and trimmings, and add their significant bit to the comfort of the flier.

The new insert type of panel now an especial offering of Consolidated is not only charming but of great value by reason of the low cost of its initial installation. To remove the whole panel the cockpit of the plane needs not be dismantled.

Consolidated Instruments and Consolidated Panels are the Leaders in new and practical suggestions to the Aircraft manufacturer.

CONSOLIDATED INSTRUMENT CO.
of AMERICA, INC.
Baltimore St. and Central Ave. - Baltimore, Md.
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Julien P. Friez and Sons, Inc., Baltimore, Md.
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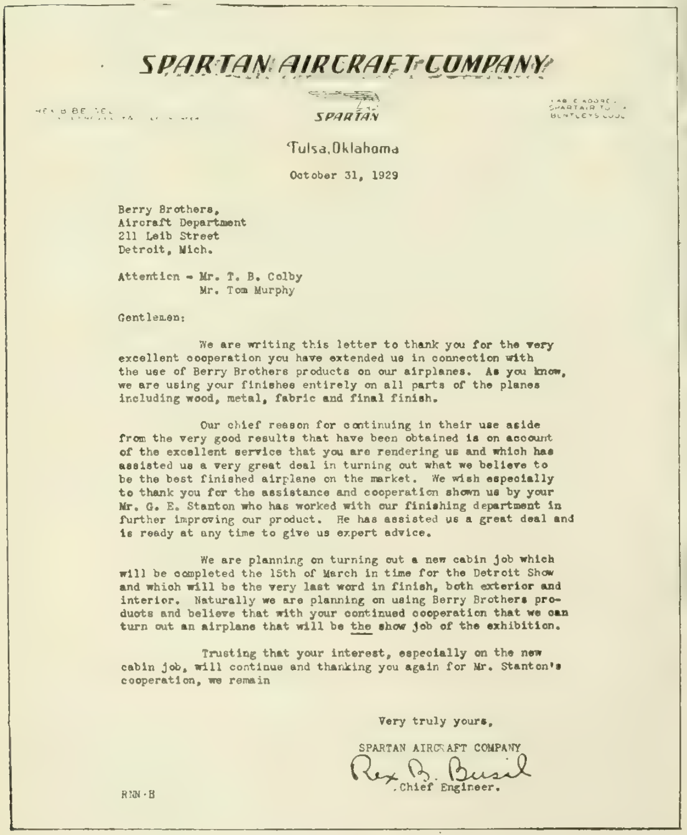
Sales, Service, and Repairs - 221 S. Lawrence St.

Consolidated Instruments

MEMBER · AERONAUTICAL · CHAMBER · OF · COMMERCE

Berryloid Best...
Says SPARTAN



SPARTAN AIRCRAFT COMPANY

SPARTAN

Tulsa, Oklahoma

October 31, 1929

Berry Brothers,
Aircraft Department
211 Leib Street
Detroit, Mich.

Attention - Mr. T. B. Colby
Mr. Tom Murphy

Gentlemen:

We are writing this letter to thank you for the very excellent cooperation you have extended us in connection with the use of Berry Brothers products on our airplanes. As you know, we are using your finishes entirely on all parts of the planes including wood, metal, fabric and final finish.

Our chief reason for continuing in their use aside from the very good results that have been obtained is on account of the excellent service that you are rendering us and which has assisted us a very great deal in turning out what we believe to be the best finished airplane on the market. We wish especially to thank you for the assistance and cooperation shown us by your Mr. G. E. Stanton who has worked with our finishing department in further improving our product. He has assisted us a great deal and is ready at any time to give us expert advice.

We are planning on turning out a new cabin job which will be completed the 15th of March in time for the Detroit Show and which will be the very last word in finish, both exterior and interior. Naturally we are planning on using Berry Brothers products and believe that with your continued cooperation that we can turn out an airplane that will be the show job of the exhibition.

Trusting that your interest, especially on the new cabin job, will continue and thanking you again for Mr. Stanton's cooperation, we remain

Very truly yours,

SPARTAN AIRCRAFT COMPANY

Rex B. Beisel

Chief Engineer.

RBB·B

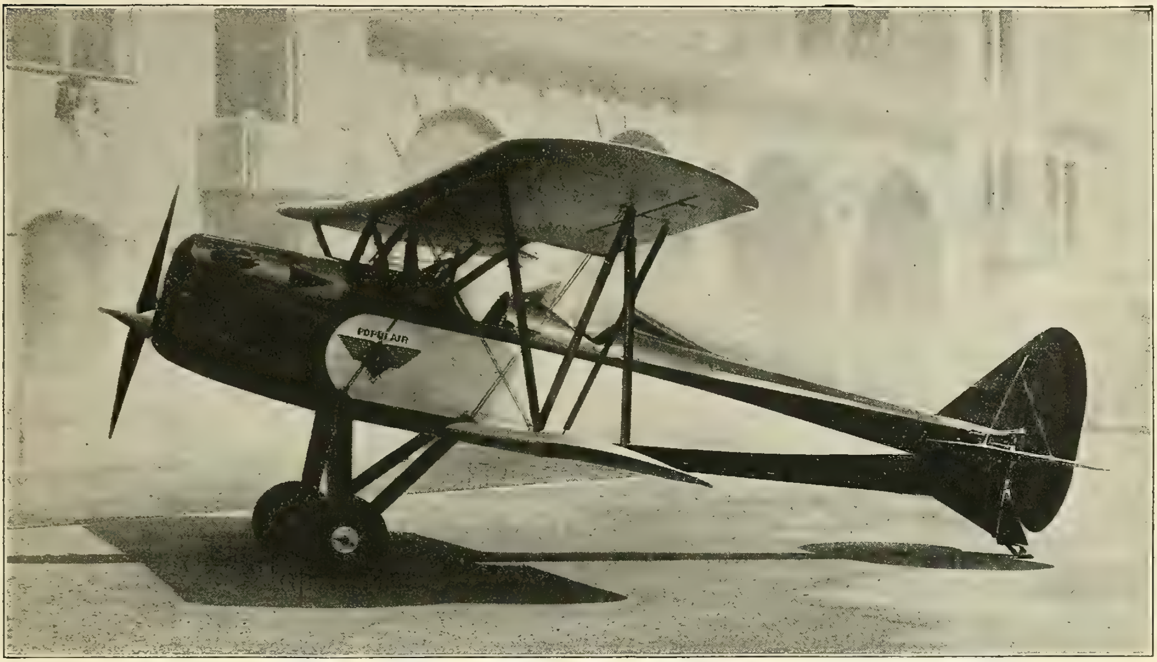
BERRY BROTHERS
Varnishes Enamels Lacquers

Detroit, Michigan *Walkerville, Ont.*

MANUFACTURERS · OF · PROGRESSIVE · AIRCRAFT · FINISHES

"USE THE AIR MAIL AND TRAVEL BY AIR"

PREMIER SHOWING OF



POPULAIR »

NEW YORK AIRCRAFT SALON »

MAY 3rd-10th
MADISON SQUARE GARDEN

Priced far below what you would expect to pay for a ship of equal beauty and performance, **POPULAIR** is destined to set new standards of value and new sales records. If you are unable to see and fly this ship during its premier showing at New York, write or wire us direct. Distributor's franchises available to responsible aircraft merchandisers. Earl Aviation Corporation, Ltd. (a closed corporation) 1001-1005 Subway Terminal Building, Los Angeles, California.

TO a plane-wise public and a world of pilots and executives accustomed to flying and selling good airplanes, **POPULAIR** makes its bow at the New York Aircraft Salon—*without apologies.*

The **POPULAIR** is everything you demand in a two-place sport training plane. It embodies a new high performance at a low, *readily saleable* price.

In the production of the **POPULAIR**, the Earl Aviation Corporation, Ltd. had a definite purpose in view—to create a small plane of superior type to anything in the field of similar character. How splendidly this aim has been achieved can well be realized upon inspection, study of specifications and demonstration of performance.

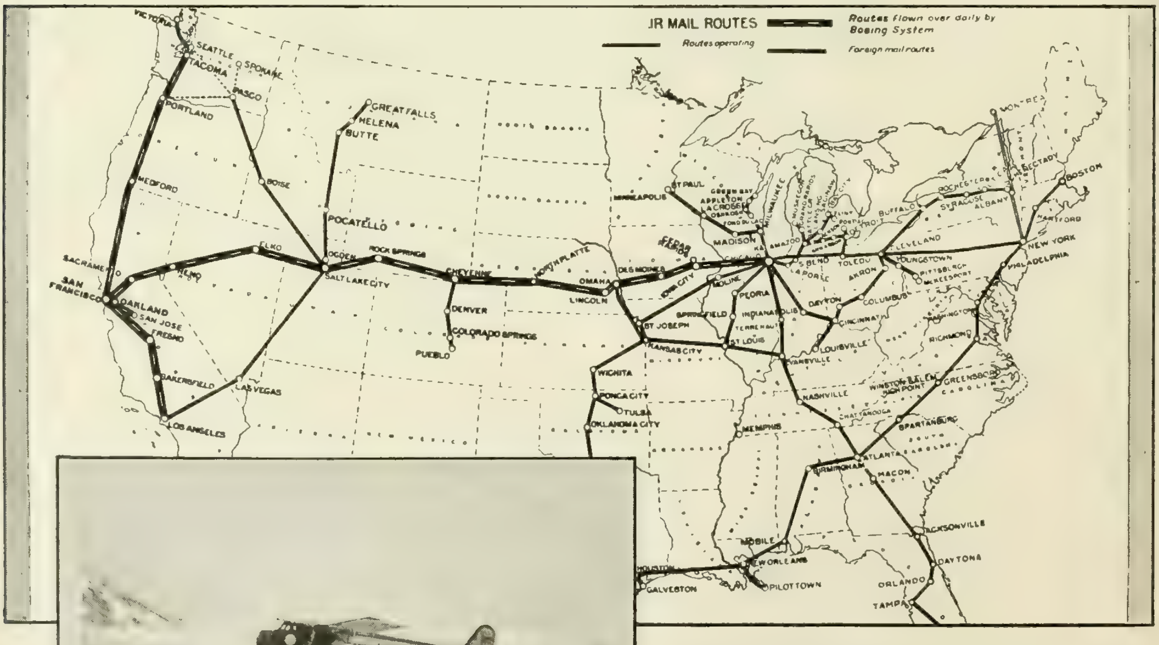
A cordial invitation is extended to pilots, aviation school executives, and you who are interested in the purchase of a plane for business or pleasure to see this remarkable new airplane.

POPULAIR

EARL
AVIATION
CORP.
LTD.
LOS ANGELES

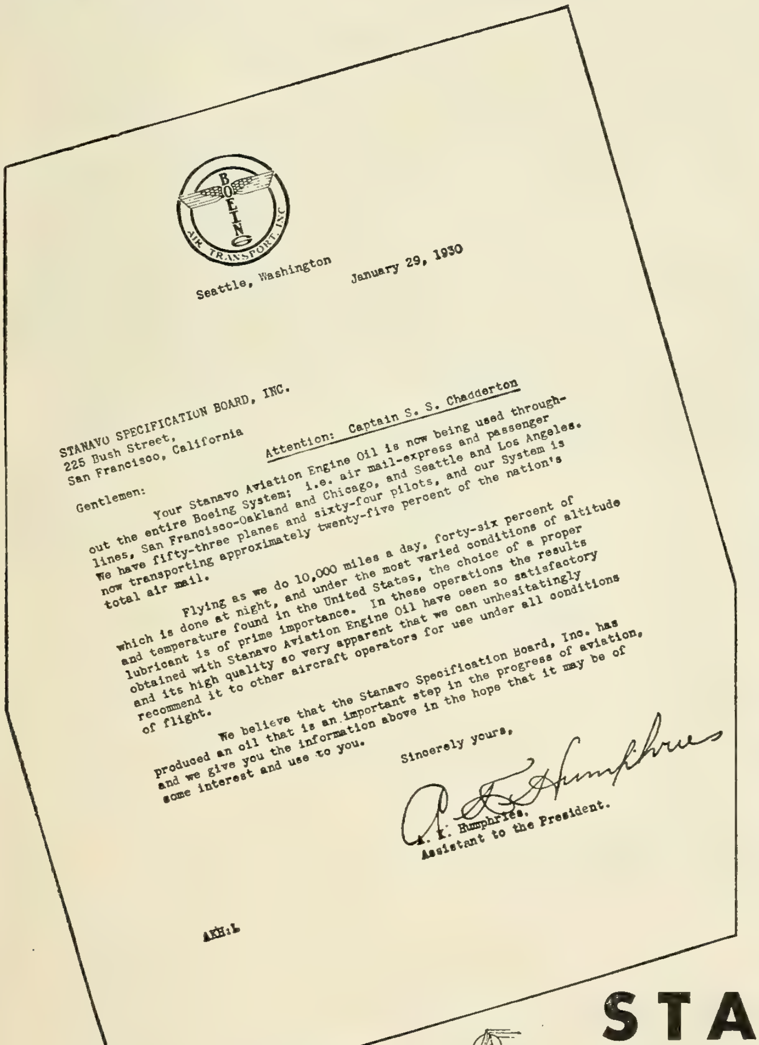
Boeing has

From Los Angeles to Seattle—from San Francisco to Chicago—10,000 miles a day. Boeing System's 53 planes use Stanavo Aviation Engine Oil



10,000 miles daily, 4,600 of which are by night; from summer sunshine to sub-zero weather; over treacherous mountain peaks at dizzying heights—the flying hazards met by the 64 pilots of The Boeing System are extreme daily tests of man and machine. Yet Boeing's record of safe transportation is unsurpassed. An outstanding tribute to system, inspection, and the careful selection of men, equipment and supplies.

gone Stanavo



BOEING AIR TRANSPORT, INC.

Seattle, Washington

January 29, 1930

STANAVO SPECIFICATION BOARD, INC.
225 Bush Street,
San Francisco, California

Attention: Captain S. S. Chadderton

Gentlemen:

Your Stanavo Aviation Engine Oil is now being used throughout the entire Boeing System; i.e. air mail-express and passenger lines, San Francisco-Oakland and Chicago, and Seattle and Los Angeles. We have fifty-three planes and sixty-four pilots, and our System is now transporting approximately twenty-five percent of the nation's total air mail.

Flying as we do 10,000 miles a day, forty-six percent of which is done at night, and under the most varied conditions of altitude and temperature found in the United States, the choice of a proper lubricant is of prime importance. In these operations the results obtained with Stanavo Aviation Engine Oil have been so satisfactory and its high quality so very apparent that we can unhesitatingly recommend it to other aircraft operators for use under all conditions of flight.

We believe that the Stanavo Specification Board, Inc. has produced an oil that is an important step in the progress of aviation, and we give you the information above in the hope that it may be of some interest and use to you.

Sincerely yours,

A. K. Humphries.
Assistant to the President.

AKH:L

Stanavo Aviation Engine Oil can be obtained from any of the oil companies listed below:

Standard Oil Company of California
Standard Oil Company (Indiana)
Standard Oil Company of New Jersey
Standard Oil Company (Kentucky)
Standard Oil Company of Louisiana
Standard Oil Company (Nebraska)
Standard Oil Company (Ohio)
Standard Oil Company of Pennsylvania
Beacon Oil Company, Inc.
Humble Oil and Refining Company
Midwest Refining Company
Pasotex Petroleum Company
The Refiners Oil Company
Imperial Oil, Ltd.
Standard Oil Company of Brazil
California Standard Oil Co. de Mexico
Standard Oil Company of Cuba
West India Oil Company

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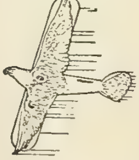


STANAVO

AVIATION ENGINE OIL

One Brand—Stanavo · One Quality—the Highest
Throughout the World

STANAVO SPECIFICATION BOARD, INC.

Organized and Maintained by

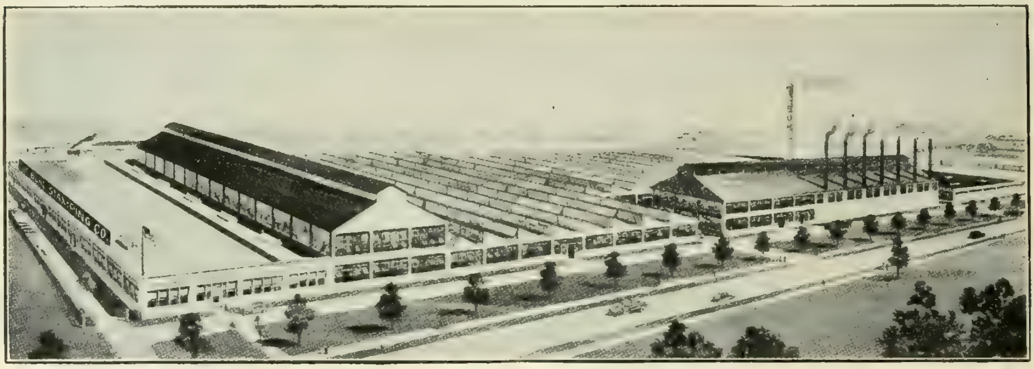
Standard Oil Company (Indiana)
910 S. Michigan Ave., Chicago

Standard Oil Company of California
225 Bush St., San Francisco

Standard Oil Company of New Jersey
26 Broadway, New York City

THE BUHL NAME has been identified with progressive industry since 1833. Buhl products today carry far more than the name alone—they preserve the priceless heritage of almost a century of manufacturing leadership and integrity.

* * *


BUHL STAMPING CO.

For more than forty years the Buhl Stamping Company has produced fine metal stampings. A complete unit devoted exclusively to the production of stampings for aircraft and aircraft engines now extends their experienced service to the aviation industry on an economically attractive basis.

BUHL STAMPING COMPANY

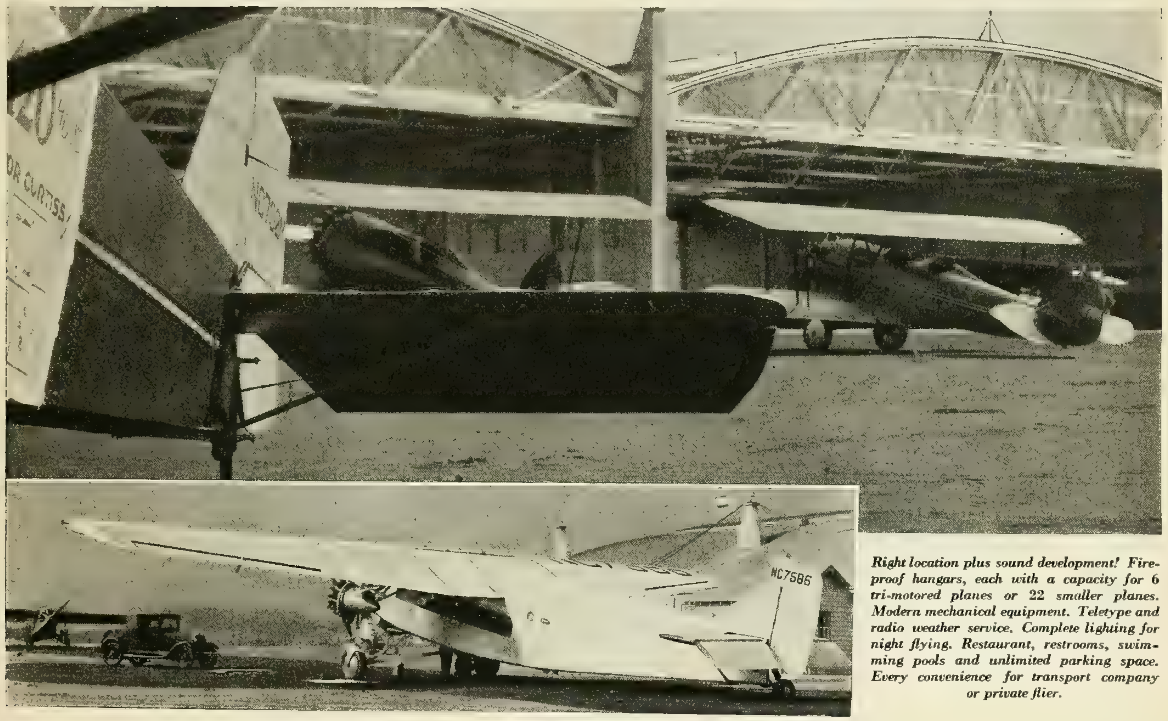
DETROIT - - MICHIGAN

* * *

UNDER THE SAME DIRECTION

The Buhl Building - - - Detroit
Buhl Aircraft Company - Marysville
Buhl Sons Company - - Detroit

We wore no rose-colored goggles when we chose this airport site



Right location plus sound development! Fireproof hangars, each with a capacity for 6 tri-motored planes or 22 smaller planes. Modern mechanical equipment. Teletype and radio weather service. Complete lighting for night flying. Restaurant, restrooms, swimming pools and unlimited parking space. Every convenience for transport company or private flier.

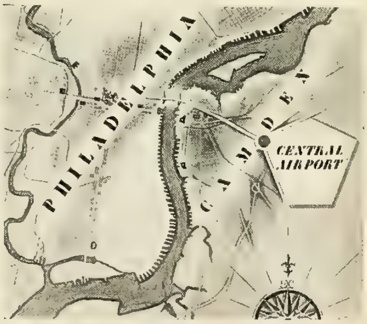
COLD LOGIC determined the location of Central Airport. Sound aviation and business principles have governed its development. Every manufacturer, distributor and service agency as well as every operator of aircraft should carefully consider these facts:

Central Airport is the most accessible *metropolitan* airport in the world. No other is so close to over 3,000,000 people or to so many people possessing the wherewithal that makes aviation pay. Among the thousands of factories in this section are many of world-wide reputation producing raw and finished materials essential to the aviation industry. There is an abundance of skilled labor from which to draw.

Close at hand are two trunk railways and the Delaware River with its ocean shipping and low rates to Central and South America and the Pacific Coast. Within a hundred miles are the country's financial, political and pleasure capitals.

In addition, here is a flying field which in size and equipment conforms to Department of Commerce A1A specifications. Its broad, level terrain, with unusually open approaches, remains hard and packed in even the wettest weather. Adjacent to it is equally desirable land of such generous acreage that it is offered on very attractive terms to responsible parties who wish to buy or lease.

Join the leaders in the industry who already are in operation here. For full particulars address Central Airport, Inc., Camden, New Jersey.



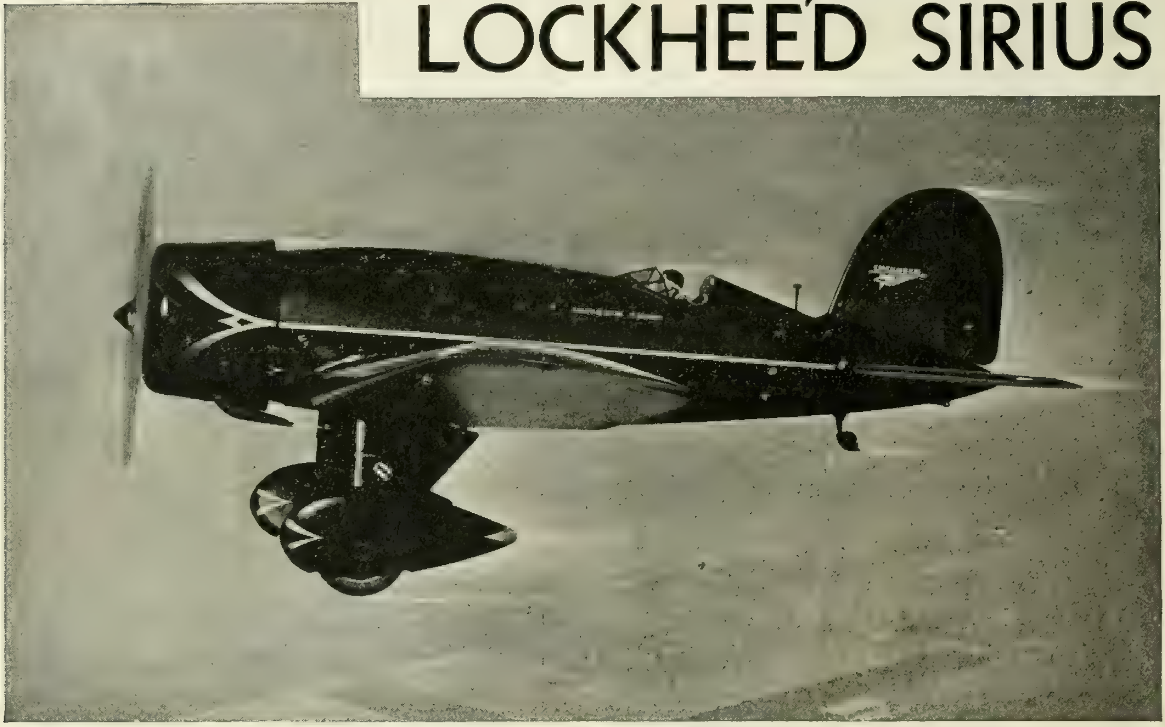
The heart of Philadelphia is only 15 minutes away, by car or bus over a 10-lane highway and the Delaware River bridge; the center of Camden, 6 minutes; ocean shipping and main rail lines, 10 minutes. A natural center of the aviation industry!

**PHILADELPHIA-
CAMDEN**

CENTRAL AIRPORT

DETROIT AIRCRAFT
LOCKHEED
SIRIUS

The New LOCKHEED SIRIUS



Low-Wing Mail Ship

Introduced for the first time to the aircraft buying public at the International Aircraft Show, the Lockheed Sirius has been accorded enthusiastic reception. Orders totaling $200,000 were received for this new ship within two weeks after its A.T.C.—No. 300—was issued.

Originally designed for Col. Lindbergh, the Lockheed Sirius is now a standard model in the famous Lockheed line. It offers passenger, mail, and express airline operators a low wing commercial plane that is easy to fly and which has a quick take-off and a surprisingly slow landing speed.

Cruising Speed	*140 m. p. h.*
Landing Speed	*45 m. p. h.*
Climb	*1000 ft. per min.*
Pay Load	*1230 pounds*

Having the same size fuselage as the Lockheed Vega, the Sirius can be fitted with a four or six place cabin, entered by a door over the wing. For use as a mail or express plane it can be equipped with a large capacity baggage compartment. Other convertible features are available on special order.

The Lockheed Sirius is priced at $18,985. Complete specifications, weights, and performance data will be supplied upon request.

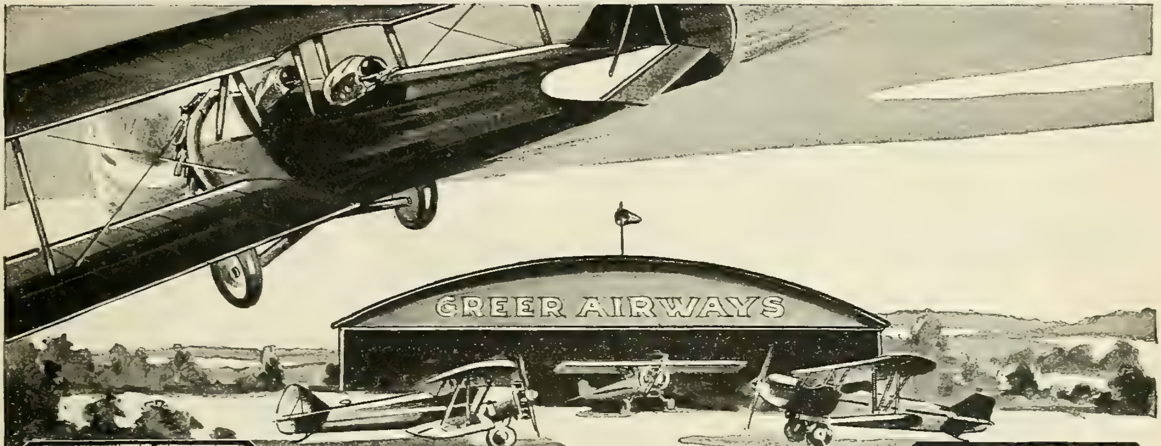
LOCKHEED AIRCRAFT CORPORATION
RYAN AIRCRAFT CORPORATION
PARKS AIR COLLEGE, INCORPORATED
PARKS AIRCRAFT CORPORATION
EASTMAN AIRCRAFT CORPORATION
AIRCRAFT DEVELOPMENT CORPORATION

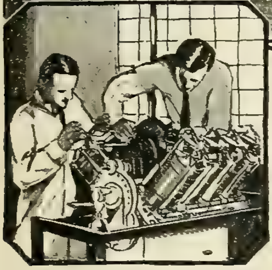
DETROIT
AIRCRAFT
UNION TRUST BUILDING, DETROIT

BLACKBURN AIRCRAFT CORPORATION
MARINE AIRCRAFT CORPORATION
GROSSE ILE AIRPORT, INCORPORATED
GLIDERS, INCORPORATED
AIRCRAFT PARTS COMPANY, INCORPORATED
DETROIT AIRCRAFT EXPORT CORPORATION

CHANIN BLDG., NEW YORK :: ROOSEVELT BLDG., LOS ANGELES

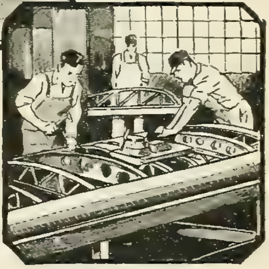
Grosse Ile Airport—Open to Visiting Pilots—Bus Service to Detroit





Continued Leadership—

AFTER 27 YEARS OF SUCCESS!



Naturally, the Greer Aviation Student Has the Greater Advantages!

YOUR success in Aviation depends upon the experience of the School which gives you your first training.

Experience, prestige and success come only to those who have themselves learned what to do—and how to do it—correctly. These qualities cannot be acquired in one year or five years, yes, even ten years. It takes a lifetime of study and effort!

Only Greer College can offer you the experience of 27 years of active, successful training methods.

Only Greer College can offer you the equipment a thorough training demands—12 floors of machinery, motors, classrooms, assembly shops, and materials. Of course, training planes and flight instructors are licensed by the Government.

Only Greer College needs to make use of three Airports within the boundaries of Chicago.

Only Greer Students have the advantages that Chicago, the "Air Capital of the United States," can give them—the world-famous Municipal Airport, about which are grouped the hangars of every famous transport company in the East and Mid-West—endless varieties of industries are here, both in the field of Aviation and out of it. Here, if anywhere, are the greatest opportunities for the graduate.

You clear visioned, ambitious and air minded young men deserve the best advantages a training school can offer you. Obviously, the Greer Student has the greater advantages.

Before you turn this page, clip the coupon in the lower right hand corner and send for your copy of "Winning Your Wings," the true story of a dependable school of Aviation!

(Inspection and Rating by U. S. Dept. of Commerce Applied for.)

One of These Greer Aviation Courses Will Meet Your Demands!

Pilot's Ground Course

This course is intended for those who wish a thorough training in the first principles of flying, with the intention to fly as soon as possible.

Airplane Construction and Motor Mechanics' Course

This is the most complete course in ground work offered by any school, meeting Government standard.

Pre-Solo and Private Pilot's Course

This course is the first step toward a Government License and includes 10 hours dual flying, if necessary, and 10 hours solo. These courses can be taken separately.

Limited Commercial or Industrial Pilot's Course

This is the next step forward to a more valuable Government License. 50 hours of solo and necessary dual flying.

Transport Pilot's Course

This is the course which will prepare you to receive a Government Transport Pilot's License, upon passing an examination. 200 hours of advanced flying under all kinds of conditions.

Special Advantages!

Railroad or bus fare allowed to Chicago to students who pay for their courses in advance.

FREE EMPLOYMENT SERVICE—Help to all Greer Students during their training period.

Greer College

2024 S. Wabash Ave.
Dept. 364 CHICAGO

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GREER COLLEGE, Dept. 364
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Please send me free your big Aviation book and full details about your Training and Employment Service.

Name..
Address..
City..State..................
Age..................Occupation..

» YOU'RE READY . . . .
. . . . . TAKE IT OFF

SOLO FLYING is a daily event at the Spartan School of Aeronautics. For Spartan students—having the advantage of superior instruction, modern equipment and advanced methods—progress rapidly to the point where they fly with confidence . . . . alone.

» For those who are determined to succeed in aviation, who cannot waste time or money, who want the thrill of success as well as the thrill of flight . . . . for those Spartan training is made to order.

» No other American school of aviation offers as many advantages as Spartan:

COMPLETE COURSES: Advanced Tri-motor Transport, Transport, Limited Commercial, Private, Mechanics, Welding, and Business Administration. Flight courses include night, cross-country and acrobatic flying.

EQUIPMENT: Spartan biplanes, cabin monoplanes and all-metal tri-motor Fords.

GOVERNMENT APPROVAL: The Spartan School is approved by the U. S. Dept. of Commerce as transport ground and flying school. All courses are approved; instructors and planes are licensed by the Government.

FACILITIES: Spartan offers excellent living conditions — modern barracks, classrooms, lounge rooms, library and restaurant. Spartan students have access to the Spartan Aircraft Factory, while the Tulsa Municipal Airport—operations base of the Southwest Air Fast Express Lines—affords them an opportunity to study every phase of commercial aviation.

LOWER TUITION: Spartan tuition fees are lower than those of other large recognized schools. Liberal extended tuition payment plans are available for all courses. Free employment service is maintained to aid students in making sound business connections in aviation.

FREE TRANSPORTATION: Free air transportation to Tulsa is provided in Ford tri-motor planes from all division points of the Safeway Lines.

» And, finally, Spartan is one of the most soundly financed aviation schools in the country, possessing both the purpose and the resources to remain "America's finest aviation school."

SPARTAN SCHOOL OF AERONAUTICS
TULSA, OKLAHOMA

« SEND FOR THIS BOOKLET TODAY

SPARTAN SCHOOL OF AERONAUTICS,
Tulsa, Oklahoma.

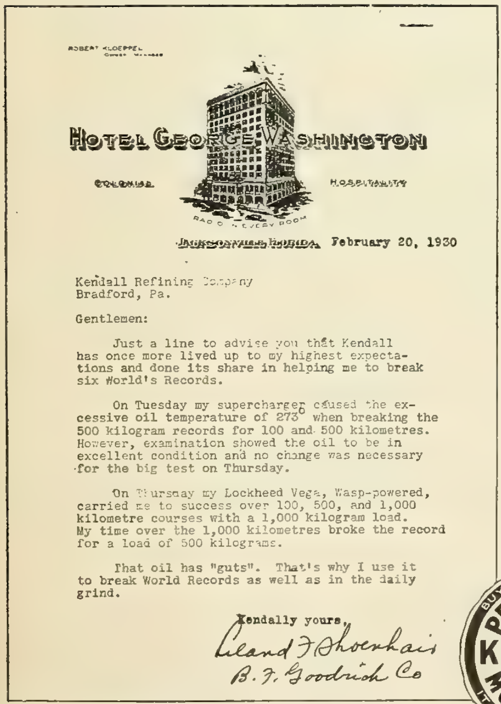
Gentlemen: Please send me your 32-page illustrated booklet and tell me about the possibilities in aviation.

Name____________________Age____

Address________________________

"Just a line to advise you... Kendally Yours, Leland F. Shoenhair," and SIX WORLD'S RECORDS FALL

"Just a line" seems to be this famous pilot's practice in announcing a history-making event. But Kendall Refining Company is proud of Lee Shoenhair's tremendous achievement, happy that Kendall Oil aided in the triumph of the B. F. Goodrich Company's test plane—therefore, Kendall headlines this page in big, bold letters.



ROBERT KLOEPPEL

HOTEL GEORGE WASHINGTON

COLONIAL HOSPITALITY

RADIO IN EVERY ROOM

JACKSONVILLE, FLORIDA February 20, 1930

Kendall Refining Company
Bradford, Pa.

Gentlemen:

Just a line to advise you that Kendall has once more lived up to my highest expectations and done its share in helping me to break six World's Records.

On Tuesday my supercharger caused the excessive oil temperature of 273° when breaking the 500 kilogram records for 100 and 500 kilometres. However, examination showed the oil to be in excellent condition and no change was necessary for the big test on Thursday.

On Thursday my Lockheed Vega, Wasp-powered, carried me to success over 100, 500, and 1,000 kilometre courses with a 1,000 kilogram load. My time over the 1,000 kilometres broke the record for a load of 500 kilograms.

That oil has "guts". That's why I use it to break World Records as well as in the daily grind.

Kendally yours,

Leland F. Shoenhair
B. F. Goodrich Co

Visit the Kendall Exhibit at the All-American Aircraft Show, Detroit, April 5th to 12th.

SIX World's Records fall—not in a six-day aviation meet, but *in two days' time*—not under the urge of close competition, but *deliberately with the irresistible and willful combination of one Lockheed Vega plane and Wasp motor, one intrepid pilot, one dependable motor oil—Kendall!*

All of the new records which Lieut. Shoenhair made on February 18th and 20th at Jacksonville, Florida, were tests in which engine power and speed were vitally necessary. A heavy responsibility was placed on correct lubrication. The results tell the story:

LOAD (*Kg-kilograms*)		DISTANCE (*Km-kilometers*)		SPEED
500 Kg	(1102 lbs.)	100 Km	(62 Miles)	185.452 m.p.h.
500 "	(" ")	500 "	(310 ")	171.228 "
1000 "	(2200 ")	100 "	(62 ")	175.997 "
1000 "	(" ")	500 "	(310 ")	168.114 "
1000 "	(" ")	1000 "	(620 ")	152.702 "

The last mentioned record also broke the world's record for planes with 500 Kg added weight over the 1000 Km course.

In the first successful test, the supercharger placed the handicap of 273° temperature on Kendall Oil, yet investigation showed no need of changing the oil. With summer heat at hand, wise pilots will profit by this ample proof of Kendall stamina under conditions of excessive heat!

Backing such consistent reliability are all the resources of Kendall's strictly modern refining methods and equipment, and the care of experienced refining experts. Kendall Oil is made exclusively from the world's finest crude oil—the Bradford Grade of Pennsylvania.

For a list of airports where Kendall is now obtainable and complete information about this remarkable all-Pennsylvania lubricating oil, address: Kendall Refining Company, Bradford, Pennsylvania.

BUY AT THIS SIGN PENZBEST KENDALL MOTOR OILS IT IS YOUR PROTECTION

KENDALL OIL REFINED FROM 100% BRADFORD GRADE OF PENNSYLVANIA CRUDE

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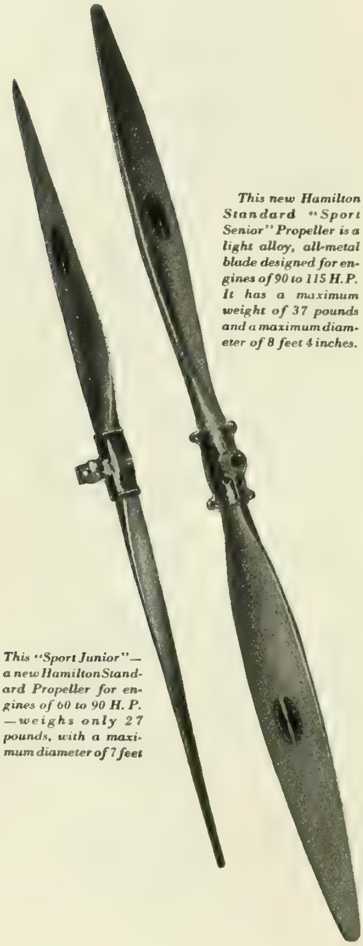
Announcing 2 NEW

HAMILTON STANDARD PROPELLERS

for 60 to 115 H.P. engines



This new Hamilton Standard "Sport Senior" Propeller is a light alloy, all-metal blade designed for engines of 90 to 115 H.P. It has a maximum weight of 37 pounds and a maximum diameter of 8 feet 4 inches.

This "Sport Junior"—a new Hamilton Standard Propeller for engines of 60 to 90 H. P.—weighs only 27 pounds, with a maximum diameter of 7 feet

Two important additions have just been made to the Hamilton Standard line of metal propellers:

The "Sport Junior," designed for engines ranging from 60 to 90 H. P.; and the "Sport Senior" for engines developing from 90 to 115 H. P. Thanks to quantity production, prices on these new models are very moderate.

Hamilton Standard light alloy propellers have demonstrated a marked superiority in efficiency over those made of other materials. A simple calculation, based on the cost per horsepower of an aircraft engine, will show how this improvement in performance is enough to justify the cost of the light alloy propeller. Another simple calculation, based on the cost of fuel, will show that the economy resulting in a relatively short time, from the superior efficiency of Hamilton Standard Propellers, will also justify the cost of the light alloy propeller. Hamilton Standard Propellers will out-live many sets of propellers made of other materials. This factor of itself will cover the cost of the Hamilton Standard Propeller.

Any one of these three striking economic advantages is enough to dictate the use of light alloy propellers. All three of them are combined in Hamilton Standard Propellers. In addition, the fact that weather can be disregarded when Hamilton Standard Propellers are used, and that damage to blades can be readily repaired, are important practical advantages. It is for these reasons that Hamilton Standard Propellers are so widely used in the commercial and military fields at home and abroad.

The addition of these two lightweight, low-priced propellers to the Hamilton Standard line makes these advantages available to the pilots of Sport Planes. The "Sport Senior," at about 37 pounds; and the "Sport Junior," at about 27 pounds, are available for prompt delivery. Correspondence is invited bearing upon these new models, and upon any other question or problem concerning aeronautical propellers.

HAMILTON STANDARD PROPELLER CORPORATION

PITTSBURGH PENNSYLVANIA

DIVISION OF UNITED AIRCRAFT
AND TRANSPORT CORPORATION

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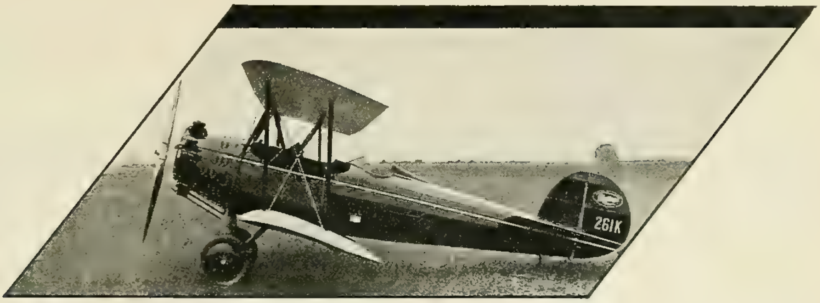


Made to the most rigid specifications to stand the gaff of training and sport

SUPPOSE the student does level off high! He'll learn something—and the ship can stand it. Fairchild KR Biplanes are taking the punishment of training work day after day, and of sport flying too. Their unusual ability to stand the gaff is due to design, and to the use of most exacting specifications that mean a large margin of strength. All welds, for instance, are in shear and not in tension. Fuselage, landing gear and other parts are of chrome molybdenum steel, which gives maximum strength where it is needed, yet holds the weight to the minimum. . . . Climb, often a vital factor in safety, distinguishes these ships, which have rates of 800 and 775 feet per minute. Ships that have to be wished out of small fields and over trees and wires have no place today. Fairchild believes that the only justifiable thrill in flying is based on complete confidence in the ability of the plane to fit the use you make of it. . . . In spite of their unusual strength, these planes are light. The power of the engine is used not to haul a heavy structure, but to provide speed and climb, and carry the fuel, pilot and passengers. Fairchild KR Biplanes are competitive in price. It is the opinion of experienced pilots that they offer better values in construction, performance, maneuverability and completeness of equipment. A booklet giving full descriptions will be sent on request.

FAIRCHILD KR-34. A. T. C. 162. THREE PLACE

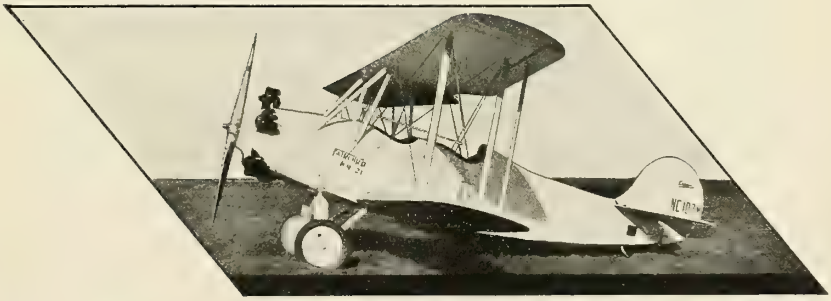
Performance: TOP SPEED, 123 M.P.H. CLIMB, 800 FT. P.M. DISPOSABLE LOAD, 885 LBS.

Specifications: Wright J-6, 165 h.p. engine and metal propeller. Note really complete equipment: airspeed indicator, altimeter, compass, dash gasoline gauge, booster magneto, tachometer, dual controls, brakes, oil pressure and temperature gauges, cockpit covers, engine cover, logbook, tiedown ropes, tools, first-aid kit, fire extinguisher, engine instruction book, wired for navigation lights. This plane can also be had with 150 h.p. Comet engine, which alters performance slightly and increases disposable load and economy. Price, with either engine, $6575 flyaway Farmingdale.

FAIRCHILD KR-21. A. T. C. 215. TWO PLACE

Performance: TOP SPEED, 113 M.P.H. CLIMB, 775 FT. P.M. DISPOSABLE LOAD, 535 LBS.

Specifications: Kinner 100 h.p. engine and wood propeller, Complete equipment: airspeed indicator, altimeter, compass, dash gasoline gauge, booster magneto, tachometer, oil pressure and temperature gauges in both cockpits, dual controls, engine cover, cockpit covers, tiedown ropes, tools, fire extinguisher, first-aid kit, engine instruction book, logbook, wired for navigation lights, celluloid inspection windows at all control bearing points, detaching pan. Price, $4685 flyaway Farmingdale.



FAIRCHILD

KR BIPLANES

FAIRCHILD AIRPLANE MANUFACTURING CORPORATION
FARMINGDALE, LONG ISLAND, NEW YORK
Plants: Farmingdale, N. Y.; Hagerstown, Md.; Longueuil, P. Q., Canada
Division of The Aviation Corporation

"Look how that oil has stood up . . . *that's Quaker State for you!*"

THAT stand-up-and-take-it toughness—that ability to keep right on giving your motor smooth and silky lubrication for hours after ordinary oil wilts — *that's* the thing that makes Quaker State Aero Oil a great oil!

It's *made* differently from other oils — there's the nub of the thing. It's made with an extra quart in every gallon—a quart *more* of heat-defying, friction-soothing *lubrication* than you get in the ordinary gallon of oil.

Ordinary refining leaves in every gallon of oil, one quart or more that is of little or no value as a lubricant to your motor—"a quart of waste" just about describes it.

But you don't get this waste in any gallon of Quaker State Aero Oil—for Quaker State is not refined in the ordinary way. It is *super-refined* — carried a step further. This extra step is an exclusive Quaker State process—and it removes the quart of waste that ordinary refining leaves in. In its place you get a quart of the finest *lubricant*—really a quart *more* than you get in the gallon of ordinary oil—an *extra* quart in every gallon of Quaker State!

And here's another important thing—every gallon of Quaker State Aero Oil is made from 100% pure Pennsylvania Grade Crude Oil, the finest "base" an aero oil can have—the finest that Nature produces!

Ask for Quaker State Aero Oil at your air-port—and learn what a great oil this is. It won't wilt under heat. Just let your motor tell you what sweet and silky lubrication Quaker State really is!

AERONAUTICAL CHAMBER OF COMMERCE

Tune in on the Quaker State Program every Friday evening at 10 o'clock E. S. T.—coast-to-coast Columbia Network.

Get that extra quart in every gallon of

QUAKER STATE AERO OIL

TRADE MARK REG. U. S. PAT. OFF.

QUAKER STATE OIL REFINING CO.

Oil City, Pa.

. . . . . . *Other Pure Pennsylvania Products are:*

QUAKER STATE MEDIUM MOTOR OIL · QUAKER STATE MEDIUM HEAVY MOTOR OIL
QUAKER STATE HEAVY MOTOR OIL · QUAKER STATE COLD TEST
QUAKER STATE TRACTOR OILS

Guaranteed 100% PURE PENNSYLVANIA OIL
The highest grade oil in the world

Verville Air Coach

with

Packard

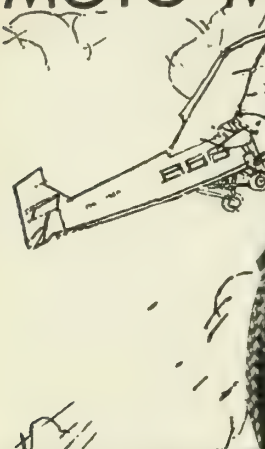
DIESEL ENGINE

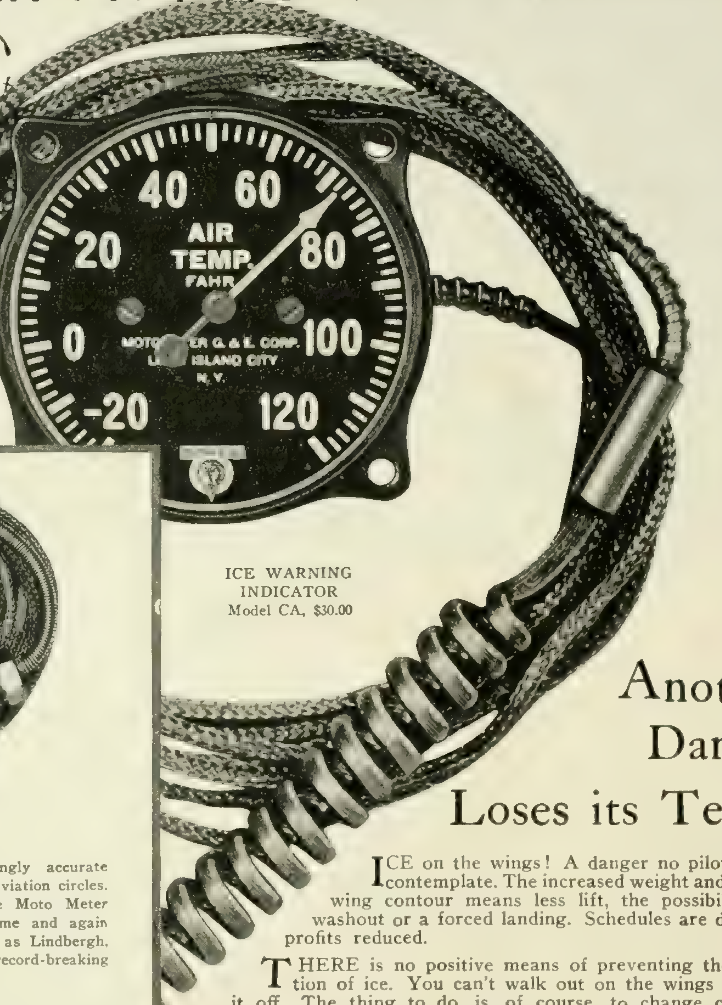
You are invited to inspect this
latest Verville creation at the
All-American Aircraft Show
Detroit, April 5th to 13th

VERVILLE AIRCRAFT COMPANY
DETROIT, MICHIGAN

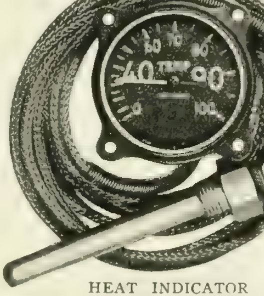
Verville
FINER AIRCRAFT
VERVILLE

MOTO METER AVIATION INSTRUMENTS





ICE WARNING INDICATOR
Model CA, $30.00



HEAT INDICATOR
Model 3015-A, $12.50

This trio of dependable and unfailingly accurate instruments have found wide favor in aviation circles. Because of their sterling performance Moto Meter aviation gauges have been chosen time and again to accompany outstanding flyers, such as Lindbergh, Byrd and Chamberlin, on their record-breaking exploits.

OIL PRESSURE GAUGE
Model 2893-A....$2.50

FUEL PRESSURE GAUGE
Model 2894-A....$2.50

Another Danger Loses its Terror

ICE on the wings! A danger no pilot likes to contemplate. The increased weight and changed wing contour means less lift, the possibility of a washout or a forced landing. Schedules are disrupted, profits reduced.

THERE is no positive means of preventing the formation of ice. You can't walk out on the wings and chip it off. The thing to do, is, of course, to change course or altitude until you are out of the danger zone.

TO DO that it is necessary to have an instrument that will give warning when the temperature falls to the critical point which, in a saturated atmosphere, means condensation. For this purpose the Moto Meter Ice Warning Indicator has been developed.

THIS sturdy, efficient instrument tells at a glance the outside air temperature—information that is doubly important in modern cabin jobs. It is as accurate and reliable as the experience, resources and facilities of the Moto Meter Corporation can make it—which is saying quite a bit.

MOTO METER
GAUGE & EQUIPMENT CORPORATION
LONG ISLAND CITY, NEW YORK, U. S. A.
TOLEDO, OHIO LA CROSSE, WIS.
Factories at Long Island City . Toledo . La Crosse . Canada . England
France . Germany . Australia

Share WACO Success

OF THE THOUSANDS OF READERS of this publication, there are not over a dozen men to whom this message is directed. To those few WACO offers an unusual opportunity.

Finishing the year 1929 with no surplus production and with a most favorable financial statement . . . with no entangling alliances and with the consequent advantage of flexibility and independence of action . . . WACO is in an enviable position this season, and offers corresponding advantages to the WACO distributing organization.

Likewise in the character and ability of its distributing organization, WACO is unusually favored. But there are still a few territories which offer splendid opportunity for immediate and future profit, to a select few individuals who can measure up to WACO standards, who can qualify for the WACO franchise.

Proved business ability . . . a record of successful salesmanship . . . personal integrity, of course . . . moderate but adequate finances . . . vision and enthusiasm for the possibilities in the aviation industry . . . capacity and inclination for consistent, intelligent, vigorous effort . . . these are the essential qualifications in the men to whom this opportunity is offered. Ability as a pilot is of secondary importance. It is desirable but can be readily acquired.

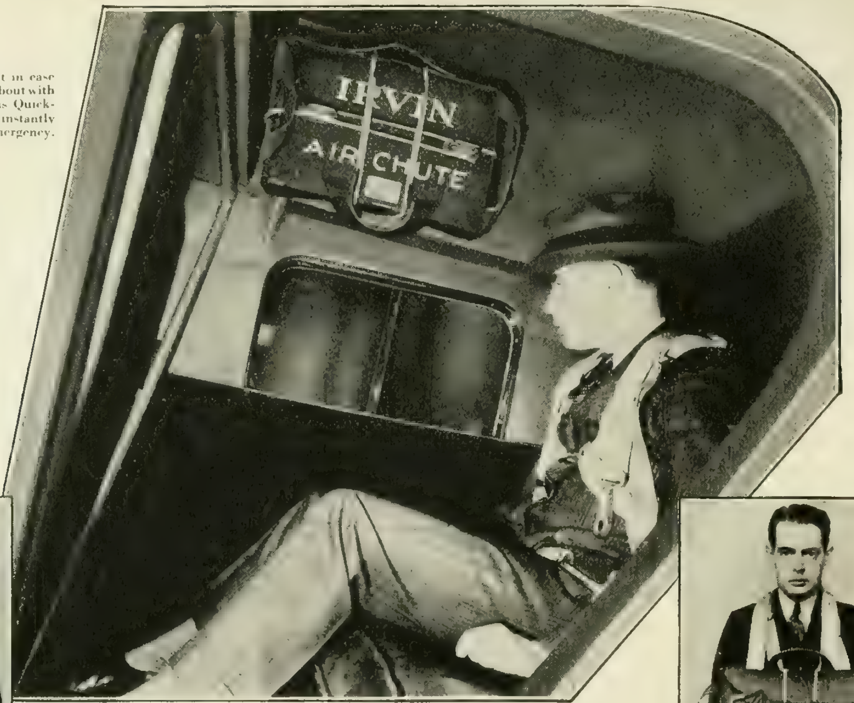
It is significant that the distributor who took delivery on the first WACO ever built is still numbered among the most loyal and enthusiastic WACO representatives . . . that a distributor located in a relatively unfavorable Eastern city disposed of fifty WACOs last year . . . that another distributor in a Mid-West territory has steadily increased sales year after year until he sold over a hundred WACOs . . . that the loyalty and stability of the WACO field organization is builded upon firm policies and uniform fair dealing . . . that adequate and fair dealer discounts consistently result in satisfactory net profits to WACO dealers.

If you are interested we would be pleased to discuss the matter with you in detail.

THE WACO AIRCRAFT COMPANY, TROY, OHIO.

WACO
AIRPLANES

"ASK ANY PILOT"



The passenger may sit in ease and comfort or move about with complete freedom; his Quick-Connector Air Chute instantly available in case of emergency.

Only the harness is worn in flight.

The pack is easily and quickly put on by pressing it against the chest. It snaps instantly to the harness and you are ready for any emergency.

Convenience and Safety Combined in the NEW... Quick-Connector IRVIN AIR CHUTE

THE Quick-Connector type of Irvin Air Chute is not worn in flight, and is neither a cushion, nor otherwise a part of an airplane chair. The chute is carried in a pack conveniently near the passenger, ready for instant use in emergency.

All the patented safety features that have brought universal recognition to the Irvin Air Chute as the standard aerial life-saving equipment of the world, are retained in this new Quick-Connector type Irvin. It is but one of the five different types of Irvin Air Chutes, suitable to every need, and available in all parts of the country. If you do not know any dealers, write to us for address of the nearest one.

Dealers should communicate directly with the company.

IRVIN *The Life Preserver of the AIR*

IRVING AIR CHUTE CO., INC., 372 PEARL STREET, BUFFALO, N. Y.

Our Motion Picture "Happy Landings" on standard width film, illustrating actual operation of the Irvin Air Chute is available free of charge to schools, clubs and organizations interested in aviation. Send for booklet and particulars.

THE NEW ACE OF SPARK PLUGS

AC MIKO

With heat range advantages

The New AC Miko line offers the special advantage of Heat Range—with seven gradations of insulator lengths to meet the heat characteristics of different engines and different operating conditions.

For example, a spark plug that gives good service under normal operation may be unsatisfactory when the ship is used constantly for extremely severe service. The remedy for a "hot running" engine and pre-ignition is to use spark plugs having shorter insulation exposed to the combustion heat. This will reduce operating temperature of the spark plugs.

On the other hand continuous running at low engine speeds may result in a "cold running" engine and fouling of spark plugs. In this case, use spark plugs having longer insulation which run hotter and thus keep the carbon burned away.

With the advantage of Heat Range, AC Miko Plugs offer also these superior features:

Laboratory tested mica of highest insulating quality.

Brass bushing sealed by electrical process. Absolutely gas tight.

The "Isovolt" electrodes, a new development, insure uniform sparking voltage, longer electrode life, and require 50% less voltage than other wire.

Electrically welded, patented, side-electrode provides 35 times better electrical and 3 times better heat conductivity than a side-electrode inserted by the old "staking" method.

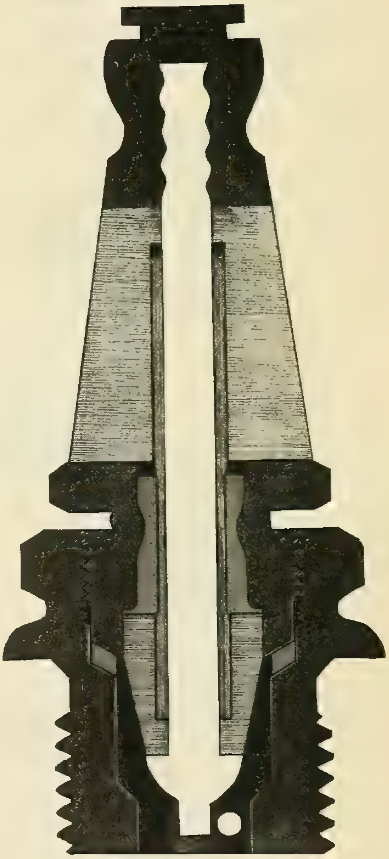
Terminal is fused to center electrode by electrical process, eliminating danger of terminal becoming loose.

Design of side-electrode makes re-gapping easy.

Steel shell chrome plated to prevent rusting.

The popular line of AC porcelain-insulated AC Spark Plugs is likewise available in a Heat Range, with gradations of insulator lengths to meet "normal", "hot running" or "cold running" conditions.

For greater certainty of performance, give yourself the benefits of AC quality, with a spark plug chosen from the Heat Range to meet your particular requirements.



Cutaway view showing superior construction of AC Miko Spark Plugs

AC-SPHINX
Birmingham
ENGLAND

AC Spark Plug Company
FLINT, *Michigan*

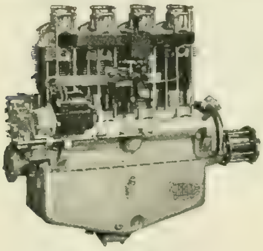
AC-TITAN
Clichy (Seine)
FRANCE

© 1930, AC Spark Plug Co.

AC SPARK PLUGS AC SPEEDOMETERS AC AIR CLEANERS AC OIL FILTERS AC FUEL PUMPS
AC GASOLINE STRAINERS AC AMMETERS AC OIL GAUGES AC THERMO GAUGES AC GASOLINE GAUGES

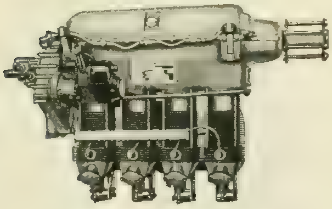
The TWENTY FIVE *All America*

Any of These Engines May Be Used, With or Without Supercharger



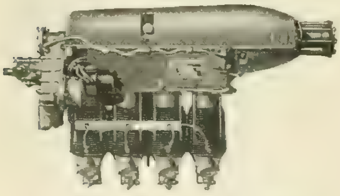
American Cirrus

Without Supercharger: Horsepower 95, Weight 275 lbs.; *With Supercharger:* Horsepower 115, Weight 320 lbs., R. P. M. 2100.



American Ensign Hi-Drive

Without Supercharger: Horsepower 95, Weight 272 lbs.; *With Supercharger:* Horsepower 115, Weight 320 lbs. R. P. M. 2100.



American Ensign Hi-Drive, Geared

Engine Speed 2100. Propeller Speed 1260. *Without Supercharger:* Horsepower 95, Weight 298 lbs; *With Supercharger:* Horsepower 115, Weight 345 lbs.

DePalma Supercharger

Positive Pressure Type. Made by American Cirrus. Available on Any of Three Engines Shown. Driven at Crankshaft Speed. Mounts on Rear End of Crankcase.

{Sanctioned by The National Aeronautic Association}

The world's greatest race over the air lanes of three nations.

$25,000 in prizes already deposited in escrow by American Cirrus Engines, Inc., associates of Allied Motor Industries, Inc.

Open to all pilots flying ships equipped with American Cirrus Engines or American Hi-Drive Ensign Engines.

The flight of more than 7500 miles will start and finish in New York. Down the eastern seaboard the contestants will go. Across old Mexico their shadows will sweep. Sunny California valleys will smile up at them. The old world hospitality of Canada will welcome them. Glory, adventure and rich rewards will await them at the end of their journey.

A racking test of airmanship and plane and motor construction.

A challenge to American fliers and to American plane designers and builders.

Yet American Cirrus Engines, Inc. offers its prize in confidence that the challenge will be met, the test survived and the development of aviation in this country given such renewed impetus as it has not received since Col. Chas. Lindbergh dropped into Le Bourget Field at Paris at the end of his non-stop flight from New York.

In fact, the purpose of this race is to promote aviation by increasing public interest in flying as a means of transportation, and by demonstrating the power, reliability and safety of moderately priced aircraft.

To the flier, the race offers the opportunity of winning personal glory and renown as well as a substantial pecuniary reward

To the plane designer and manufacturer it offers the opportunity of proving his product before the public in a manner not only spectacular and thrilling but, above all else, convincing.

At the left are shown the three types of engines with any of which competing planes may be equipped.

Wire or write today for full information as to entry requirements and rules and regulations of this record-breaking race.

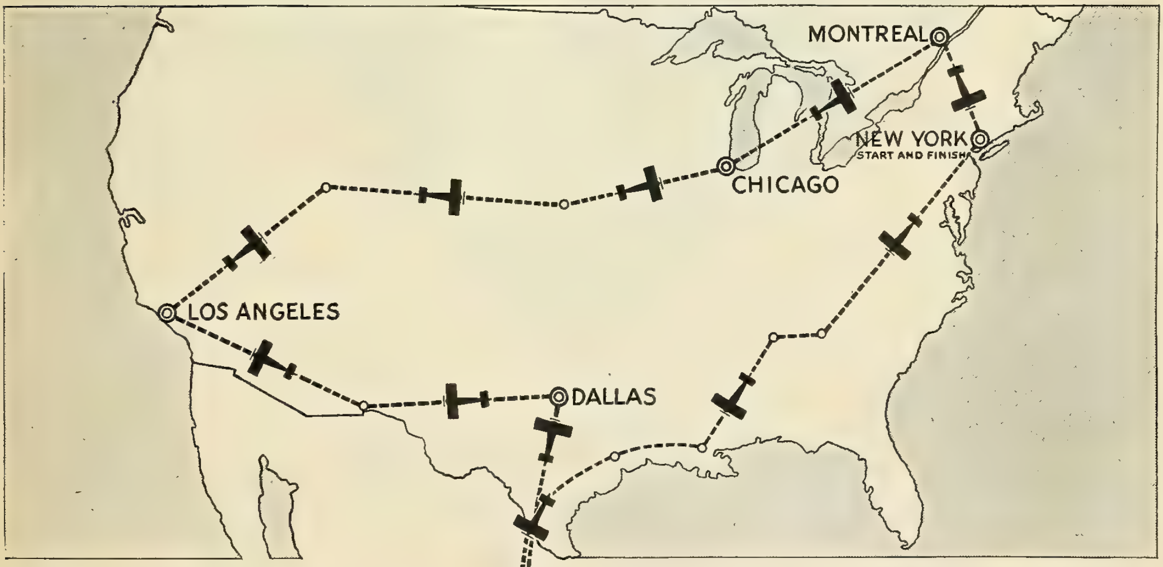
CIRRUS AMERICAN CIRRUS ENGINES

THOUSAND DOLLAR

Flying Derby

First Prize.. **$15,000**
Second Prize **$ 7,000**
Third Prize **$ 3,000**

TOTAL $25,000



Other Facts of Importance

Starting date — about July 21st

Entries Close July 7th

MEXICO
CITY
ALTITUDE
7350 FT.

Minimum number of starters—15

Winners to be determined by total elapsed time

INCORPORATED, MARYSVILLE, MICH. ENSIGN

CONFIDENCE

IN A JOB WELL DONE

"I've been over her from spinner to rudder, and she's O. K. Then, too, I've fueled her with Skelly Aerodynamic Gasoline and lubed her with Skelly Airplane Oil. It's a long run, but that ship will go on through."

Hazards are reduced to a minimum in planes using Skelly products. Pilots know this by experience. And mechanics know a plane sent out thus serviced, will return none the worse for wear, no matter how long or hard the flight.

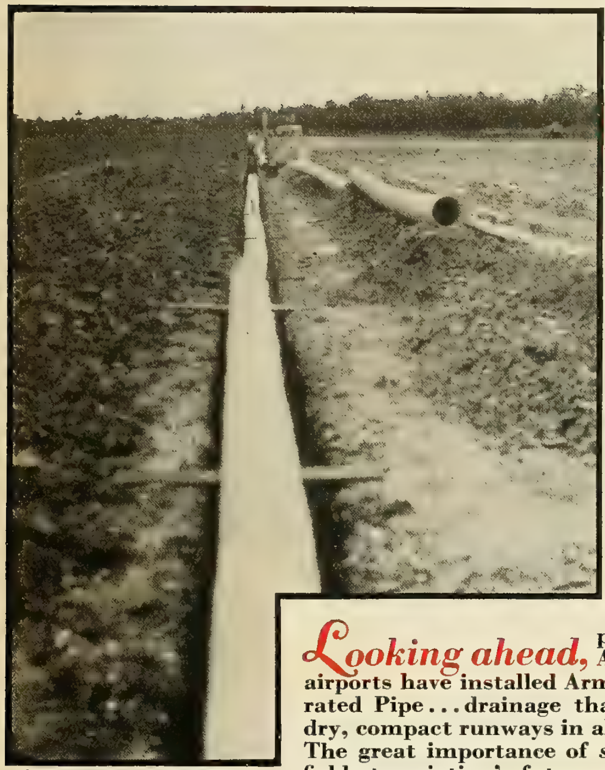
SKELLY AERODYNAMIC GASOLINE

SKELLY AIRPLANE OIL

SKELLY

AVIATION SALES DEPARTMENT SKELLY OIL CO., TULSA, OKLA.

The FUTURE of AVIATION depends on Airport SAFETY



ARMCO

ARMCO *Perforated* PIPE

answers the need

Installing Armco Perforated Pipe at the Menefee Airport, New Orleans. This site was once a swamp.

Looking ahead, prominent American airports have installed Armco Perforated Pipe . . . drainage that insures dry, compact runways in all seasons. The great importance of *safe* flying fields to aviation's future cannot be overestimated.

Armco, ever pioneering in the interests of better drainage, is keenly aware that a hazardous terrain harms more than just the field that possesses it. It is a setback to aviation to have, for instance, an operating company cancel cities from its schedule because landing fields are muddy, unfit — dangerous for landing! With Armco Perforated Pipe of Armco Ingot Iron just beneath the surface, rain water is carried off as it falls. Far and wide, the Armco drained field is a regular and preferred port of call for flyers.

The record of Armco Corrugated Iron Pipe performance—24 years in the ground — is unequalled by any other corrugated metal drainage product. It means many years of trouble-free service. Rollers, trucks and landing planes do not affect it. It is strong, flexible—cannot crack or break.

Send the Coupon for comprehensive new booklet, "Building Safety Into Airports with Efficient Drainage Construction." Free.

Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand.

ARMCO CULVERT MANUFACTURERS ASSOCIATION, *Middletown, Ohio*

●

You Can All Help

TO PROMOTE AVIATION'S SUCCESS

●

Pilots . . Urge airport managers to plan for better drainage.

●

Airplane Manufacturers . . Make your own factory port an example of good drainage.

●

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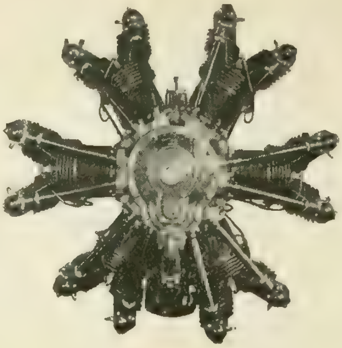

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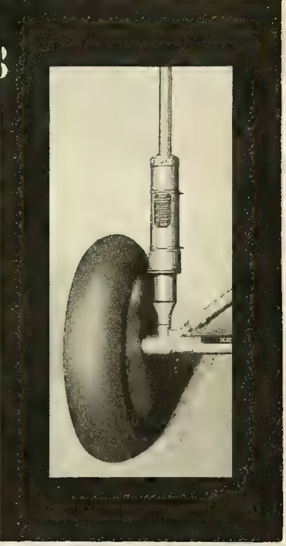

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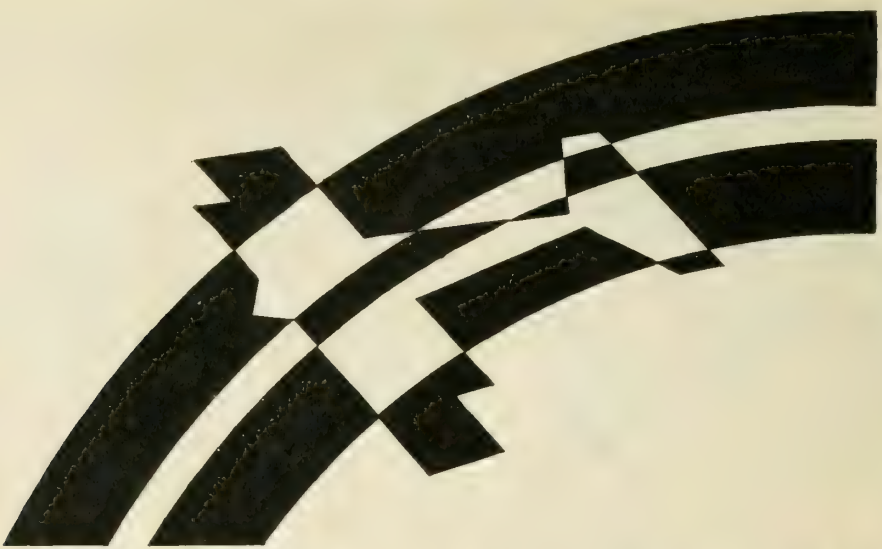

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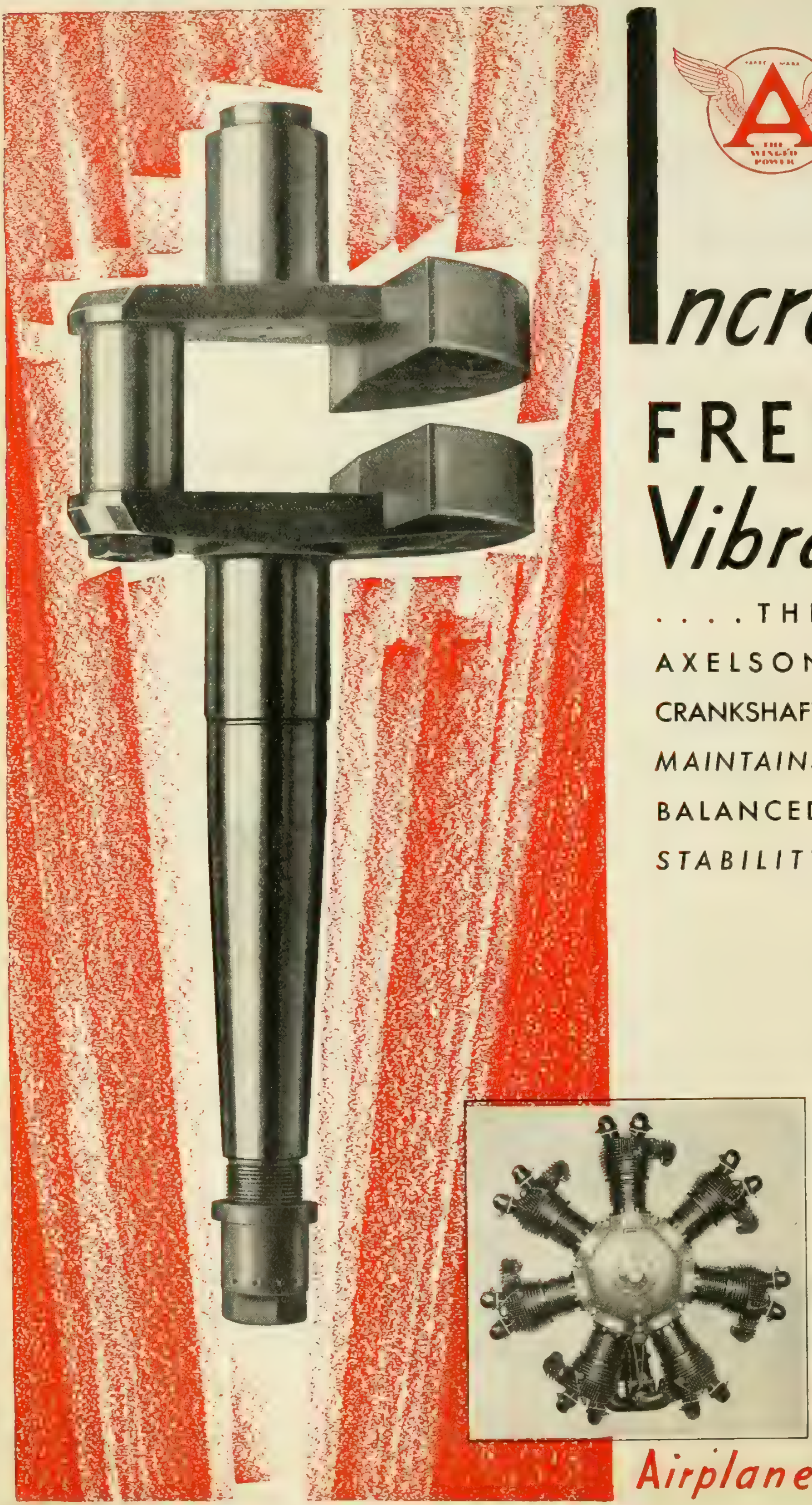

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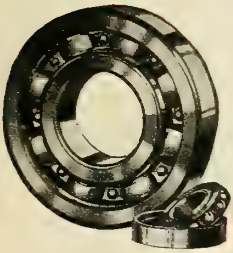

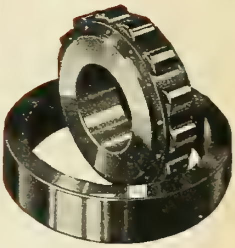

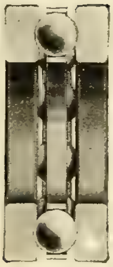

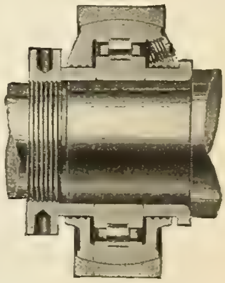

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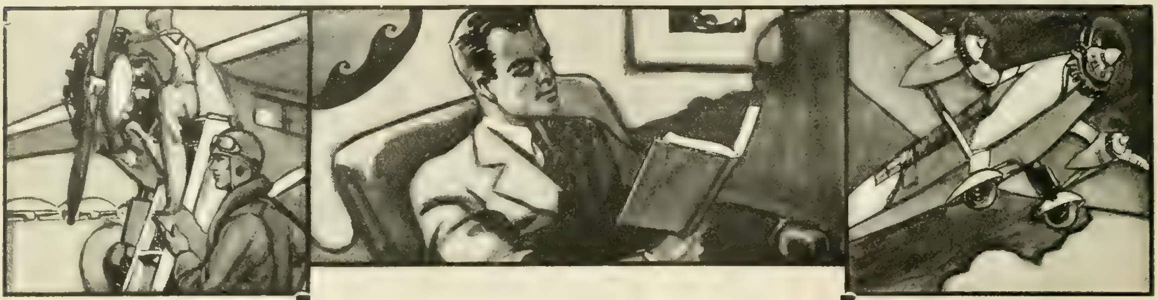

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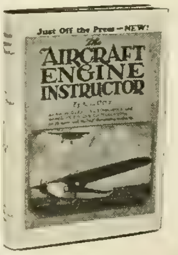

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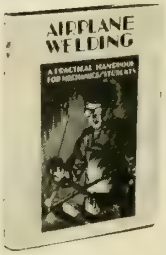

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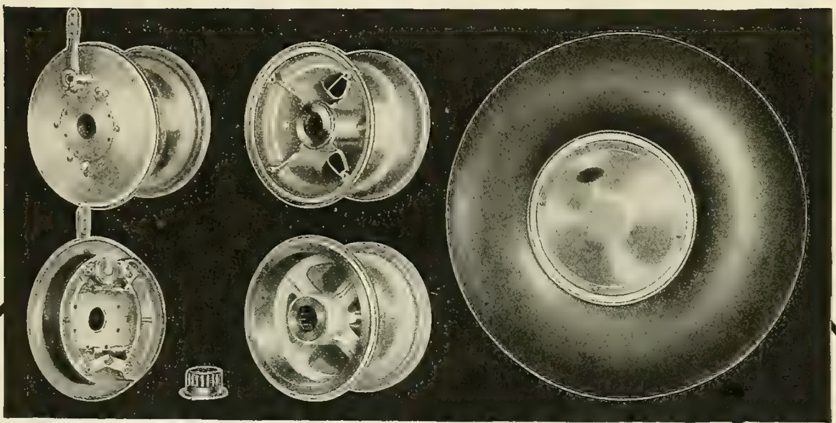

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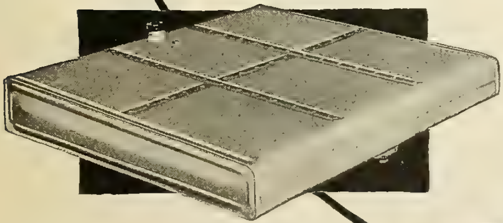

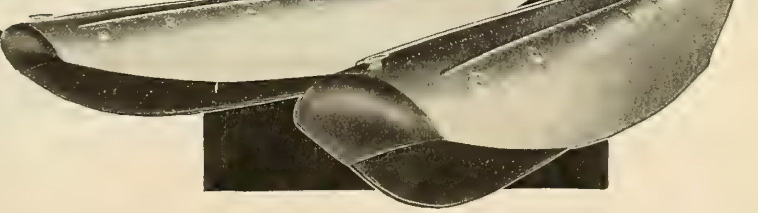

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VOLUME 16 NUMBER 4

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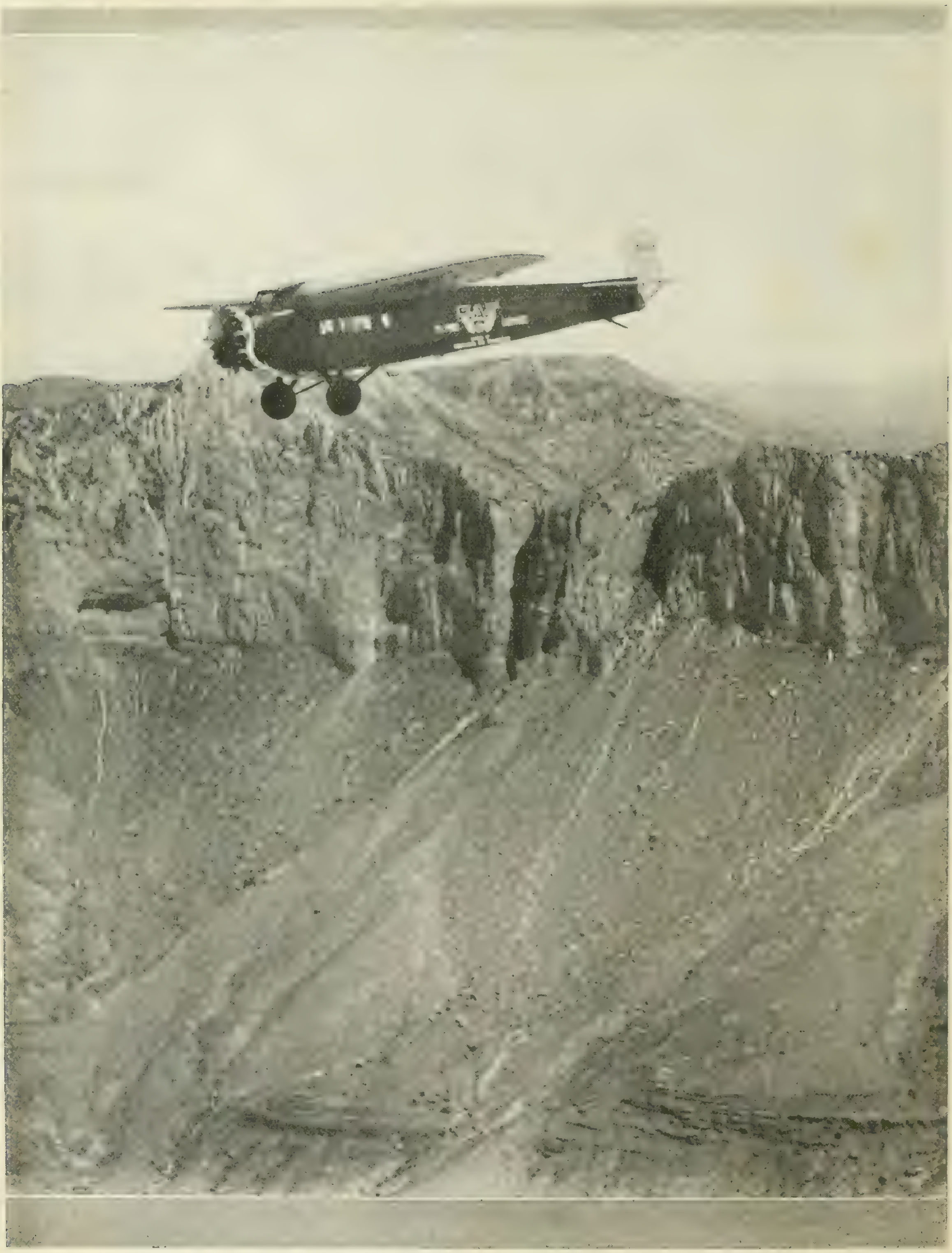


Photo Courtesy of Southern Air Transport, Inc.

A Fokker passenger plane flying at an altitude of approximately 8,500 feet, passing "El Capitan" Peak in the Sacramento Mountain Range, one hundred miles east of El Paso, Texas.

SYSTEM in the INDUSTRY

By
G. Thornhill

IT is a far cry from the day of the barnstormer with his erratic flights from one town to the next, to the era of scheduled passenger service weaving a web across the nation, but it is a still farther span from the period of one-man organizations to the highly organized, highly systematized business of today.

In the old days—for even aviation now has "old days"—the pilot was president, vice president, general manager, operations manager, maintenance and repair department, and accounting staff. His assets were his ship; his liabilities the gasoline and such few repairs as he deemed necessary to keep the plane flying. His operations system consisted of selecting a place to "joy-hop," collecting fares from his passengers and transferring them, counted or uncounted, to his pocket. His only records were his mental notes of "the day he carried the Senator and his cat" or the time "the crowd kept him flying for five hours straight." He had only the vaguest idea of the "time" on his ship and his own hours in the air were frankly a matter of conjecture.

In other words, there was nothing remotely resembling system. Building an organization and devising systematic methods to handle the industry has been as important a problem as improving equipment and educating the public to the advantages of air travel.

It verges upon the trite, of course, to suggest that there has been the handicap in lack of precedence for building this system. But in no sense have men been pioneers more than in moulding from experience of their own—sometimes dearly acquired—an adequate system for making aviation a business, an industry, and not a mere sport for daredevils or a recreation for those who had little need to count cost or profit.

Borrowing a little from practices of other modes of transportation, a little from general business policies, and creating a great deal to apply to the new industry alone, aviation pioneers have evolved a business that has commanded the respect and confidence of the country's great financiers. Systems of checking and re-checking, of tabulating results, systems for the scientific operation of air transport and its associated activities—all these have grown out of chaos within a startlingly brief space of time.

One of the most progressive in this effort has been Southern Air Transport, a division of American Airways, Inc. Beginning with the first air mail lines in Texas, the company has gradually spread out its services to include most phases of aviation over a wide territory in the South. As it grew in size and scope, it revised and remodeled its operating methods as experience proved them inadequate. Early this year the company was made a part of a system covering the whole country. Evidence of the soundness of its work is apparent in the fact that but few changes in its operating system were made when the company was incorporated into the larger organization.

It seems appropriate, therefore, to review briefly the system under which Southern Air Transport is operated. In the January issue of AERO DIGEST, an article entitled "Basic Forms for Operations" presented an outline of some of the forms used in this connection. Under a common staff of executives, the S.A.T. is divided into a number of different cómpanies. The operation of scheduled air mail and passenger lines, the servicing of planes and distribution of aeronautical equipment, the building of airports, and the maintenance of a coördinated system of purchasing of materials are among the functions of various divisions and departments of the company.

The division operating passenger and air mail service is divided into three units: the traffic department, the operations department, and the accounting department.

Traffic Department

The traffic department has the responsibility for creating the mechanical systems for securing passengers and air mail poundage and for handling them with the greatest facility. In building its market, this department employs a staff of "field men" who contact potential air transport patrons. These men make daily reports to their office. A record of all calls made comprises a part of a "prospective passengers" file, in which is also filed a record of all passengers who have flown the lines and preferred lists, secured through chambers of commerce, of individuals who are potential users. From reference to this file, contacts calculated to increase traffic are made by letter and through personal calls.

The system of handling passengers has been borrowed, with certain modifications, from railway methods. Tickets are printed with consecutive numbers, and a series is issued to the field agent at each division point in the system. In filling out a ticket, the field agent retains one part, labeled the "Auditors Advice," which is mailed, together with a record of all other cash received from whatever source, in the "Field Agent's Daily Report." This part of the ticket must check with that received by the pilot, and any shortage is charged to the account of the field agent.

Prepaid orders are issued to hotel porters, who serve as part time ticket agents. These porters collect the fare from passengers and turn it, as well as a written report, over to the field agent, who issues the tickets to the passenger upon the call.

Pleasure flights are also handled through numbered ticket book series in which every ticket must be accounted for by the field agent or pilot in making settlement.

Cash received at any of the branches from the sale of Southern Aeromotive Service (servicing division) materials is accounted for with a sales ticket, which is checked by the parts department of that company.

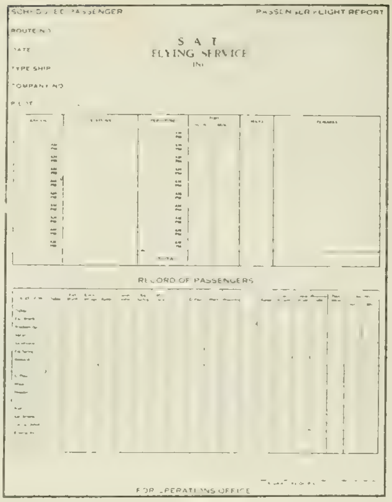
The system of records for handling air express, which has also been borrowed from railway practice, utilizes four waybills: the shipper's receipt; the Auditor's Advice; the waybill attached to the package, which is signed by consignee and returned to the accounting department; and the waybill which is retained by the field agent at the point of origin. The receipt of the signed waybill checks against the notification of shipment received by the accounting department and closes the transaction.

Copies of all transactions—including ticket stubs, together with names and addresses of passengers, copies of prepaid orders, pleasure flight tickets lifted, express shipments, stock sales tickets, and the duplicate of the bank deposit slip—are all attached to the field agent's daily report.

No small part of the traffic department's work has consisted of arranging schedules, so correlating air travel and rail connections that the advantage of air travel is not lost to the passengers as a result of delays and lay-overs. Experimentation with schedules has aided this department in determining what services appeal to the greatest number of passengers and in learning to take advantage of any peculiarities of given localities.

Operations Department

The operations department has the responsibility of keeping the ships in the air and, with the accounting department, that of compiling all reports regarding their operation. In the operations office is collected a mass of data and detail that the old barnstormer never suspected existed in connection with airplanes. Records are so complete that up-to-date data concerning any phase of operations can be furnished at any time. The exact number of hours on any given ship, with time in various uses listed, the time on the engine, with number of hours since last overhaul; the number of passengers and pounds of mail flown up to a given date; information on the activity of any pilot on any given day—in short, any question concerning the planes or airline operation can be answered in a moment's time in the operation office. A significant point in this connection is the simplicity of the system used. Most of this information is tabulated from two simple operation forms filled out by the pilot in flight.



SCHEDULED PASSENGER

PASSENGER FLIGHT REPORT

ROUTE NO

DATE

TYPE SHIP

COMPANY NO

PILOT

S. A. T.
FLYING SERVICE
INC

RECORD OF PASSENGERS

FOR OPERATIONS OFFICE

Passenger flight report, which is filled out by the pilot for each trip

The following tabulation gives a concise presentation of the reports circulating through the operations office:

REPORTS COMING INTO OPERATIONS OFFICE

From Division Points (Daily)

Mail reports on poundage.

Daily flight report on all ships (flying and ground time; pilot; plane number; miles, hours in various types of work; where).

From Pilot

Aircraft logs (time in flight).

Pilot's flight report (Carbon of aircraft log with added remarks).

Passenger flight reports (number of passengers enplaning and deplaning at points; time of departure and arrival).

Report to maintenance department (collected by operations office and turned to maintenance).

Inspection report (made out by inspector, accepted by pilot and turned in with flight report).

From Division Points (Monthly)

Short passenger hops.

Special cross-country hops.

Posting records of parts on the master perpetual inventory

From Shop (Bi-Monthly)

Survey of work in shops (giving engines and aircraft under overhaul; probable date of completion, etc.).

From Shops (From Time To Time)

Inspection reports (report of inspector on overhauled ships).

Engine Transfer (why pulled, time, etc.).

REPORTS GOING OUT OF OPERATIONS OFFICE

To Traffic Men and All Postmasters (Daily)

Scheduled operations on mail (dispatching reports).

To Traffic Department, Aviation Corporation

Reports on Texas line operations (showing arrival and departure of all ships; can be used by traffic to check operation office figures on monthly operations).

To Accounting Department

Daily flight record (complete record of flight, compiled from daily flight report from division points).

Pilot's flight report (not used; merely collected from pilot pay record).

General Circulation (Weekly)

Ship and engine directory (giving number of ships in company, motor and ship numbers, engine changes and transfers, use of plane, attached to what company and division, etc.).

To Accounting Department, Aviation Corp. (Monthly)

Equipment report (model, manufacture; date purchased; Federal license number; purchase price; flying time for various purposes; total time since last overhaul; use of plane, where located; number days out of commission, etc.).

To Officials, Accounting Dept., and Aviation Corp.

Operations report (General summary—compilation of information from pilots' reports, station reports, etc., giving hours and miles flown, miles schedules, percentage completed, cancellations, forced landings, etc.).

Failures, delays (sent also to Post Office Department).

To Accounting and Sales Departments, Aviation Corporation (Bi-Monthly)

Surplus ships (complete information, similar to equipment report).

Also quarterly, semi-annual, and annual operation summaries. Special reports of every description.

In addition to the reports sent out, the following are retained in the operations office: a semi-weekly summary of time on engines and ships since last overhaul; aircraft and motor logs compiled from pilots' flight reports; inspection reports, with shop records, on all ships out of service; a diary of the day's operations, which is in effect a permanent record of dispatching reports; a master log book, listing daily all time on engines and ships; and copies of all statistics and reports sent out to any individual, division or company.

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THE DEPARTMENT OF COMMERCE POSITION IN ACCIDENT PUBLICITY

By William P. MacCracken, Jr.

Formerly Assistant Secretary of Commerce for Aeronautics

AFTER having experimented with the trial and error method, I believe that the findings and recommendations of the Department of Commerce inspectors as to each accident should not be made public. This conclusion is based upon several reasons. In discussing these it is important to keep in mind that the function of the Department is not to fix liability for the accidents. That is a function of the courts. The function of the Department is to determine what changes in the regulations can be made to increase the safety of air transportation, to determine whether or not the regulations which exist are being properly administered, to insure a maximum of safety in air transportation, and to inform the public in a general way of the progress along these lines.

William P. MacCracken, Jr.

If those are the correct functions of the Department, as I can conceive them to be, making public the findings as to each accident would prove a serious handicap. The harm which might result from giving publicity to these findings is three-fold: Primarily, it would make it difficult to obtain accurate testimony relative to an accident. At the present time, in investigating accidents, the Department has no authority to compel the attendance of witnesses; but even if it had that authority, which is something that could readily be provided by amendment, it would still find a great deal of difficulty in getting a full, frank expression of opinion. A man can be compelled to state facts, but he can't be compelled to give his opinion. The question of opinion is not something that is very easily drawn out of a witness, if he is a hostile witness. Therefore, in dealing with any hostile witness, it is almost impossible to get any opinions that are worth while if he knows that his opinions are going to form the basis of a fact finding that will be made public. On the other hand, if he knows they are going to be treated in confidence and to be used only for the two purposes which I mentioned in the first instances, he is nearly always very willing to give his opinions.

The causes of most of our aviation accidents are largely matters of opinion. No one can put them down with a great degree of certainty.

Of even more importance than securing trustworthy opinions from witnesses is obtaining even more complete opinions from inspectors and the Crash Board of the Department. These are indispensable to those responsible for promoting regulations and administering the Aeronautics Branch. It is possible to obtain a much franker expression of opinion from inspectors and the Crash Board if they know that their opinion is to be in confidence and that it is not to be made public—if they know they do not have to stand up and defend their findings before a public with a very limited aeronautical experience.

It isn't important in compiling constructive information that every accident be analyzed correctly. The important thing is that the averages are right, because they are the basis of the Department's actions at the present time. If the averages are pretty nearly right, that is about all you can expect of them. If the six members of the Crash Board who allocate percentages and pass on the report of the individual inspector, who makes his recommendation, knew that they must defend their findings in a public report, they would be allotting more and more crashes to causes unknown and undetermined. Which would be only a logical thing to do. They would not want to publish as findings matters of conjecture.

Furthermore, there is and would always be a great reluctance to place responsibility on a man who has passed on. It would be an easy thing to do, but nevertheless the fellows don't like to do it; if they did put the responsibility there, they know people would say they were "passing the buck" to a dead man. That is the natural reaction to expect. And yet, if they did not put any responsibility on a dead pilot, people would immediately say, "Well, they were trying to protect the memory of somebody who had a clean record before, and they didn't want to say he was responsible for this accident."

Under those circumstances, it would be very difficult to get an honest expression of opinion from either an individual inspector or from the Crash Board as a whole.

By no means the least important factor to be considered is that, in analyzing an accident, the Department often finds it extremely difficult to determine the exact causes. There have been crashes in which there was not a single survivor or eye witness. Even the exact time of the accident often is uncertain, and sometimes several days elapse before the wreck is found. Weather conditions in the immediate vicinity where the crash occurred, for a period from thirty minutes to an hour before, may be equally uncertain.

There are too many unknown factors in a situation of that kind to make reports on it a matter of general public information. Let us take something that is a matter of more common experience: an automobile accident occurs on the corner of Fortieth Street and Madison Avenue, in New York. There are six eye witnesses to it, all disinterested. The majority of them have ridden in an automobile, practically 100 per cent of them; probably five out of the six have actually driven cars. Yet, their stories will be quite at variance as to how that accident happened.

In an investigation of aviation accidents, unless the crash occurs right on an airport, the majority of the witnesses are people who have never been up in the air. If the accident happens out in the country, usually the only persons who see it are farmers or others of that type who know nothing about flying except what they have read in the papers. They may be absolutely honest and disinterested, but their stories just can't be believed. Because of their ignorance on aeronau-

(*Continued on page 248*)

CIVIL AVIATION IN SWEDEN

By Harry Chapin Plummer

WITH an "aerial merchant marine" that has sustained 940,000 flying miles for six years without a single accident and with a corps of pilots renowned for their skill, Sweden has taken her place among the first of the world's nations in aeronautical development. Within the last six years 61,200 passengers have been carried in Swedish planes without accident to either voyagers or craft. Not only have all the aerial services of the kingdom increased in the number of passengers transported, in the number of planes placed and maintained in service, and in freight and mails carried during 1928 and preceding years, but the home and trans-frontier services have been augmented and extended.

In flights over the Arctic wastes of Lapland and over vast stretches of Sweden's outlying territory, rescues of human life by the Swedish pilots have been reported and checked up in detail by government and Carnegie Foundation investigators. There have been instances of the outbreak of epidemics and contagious diseases in remote Lapland villages, where the inability to obtain surgical and medical relief meant the decimating of populations huddled together in fright at an unseen scourge. Flying in temperatures of from thirty to forty degrees below zero, the Swedish pilots and planes have made a real contribution to health and welfare throughout their country and in neighboring lands.

Sergeant F. Cornelius, most famous of Swedish "aces," was styled "the Samaritan of the Air" by no less distinguished a compatriot than King Gustav himself, when the monarch bestowed upon him a high decoration. The Aero Club of Sweden followed the sovereign example by presenting him with a gold plaque, while the Carnegie Foundation singled him out for one of its awards for heroism. Upon Cornelius' successor, Lieutenant Pilot Gustav Lindow, a Carnegie Foundation award was bestowed also for a special act of heroism.

During the last few years, the spasmodic outbreaks of epidemic in Lapland and disasters attendant upon abnormal snowfall and excessive cold in the more remote northern areas of Sweden proper, have brought into being the "aerial ambulance," which is now maintained as a regular institution by the Swedish Red Cross. This service has been applied to all phases of human activity throughout the kingdom, so that it has come to be almost as common an occurrence to summon an aerial ambulance in the rural sections of the country as it is to call for a motor ambulance in the streets of Stockholm or any of the other large metropolitan centers in Sweden.

Aviation progress in Sweden has led to the appointment of a committee to draw up a subsidy proposal for the Riksdag, or Parliament, this year, by which the Aktb. Aerotransport, the only Swedish aeronautical transportation unit, will receive a regular subsidy, following a temporary, or more or less makeshift, agreement operative over the last six years, and terminating before the close of 1930, by which that company has had recourse to a general subsidy fund, depending upon the number of kilometers flown by its units in the carriage of passengers and mails over the established air routes. Exclusive of the government subsidies, the company increased its earnings from 57,780 crowns ($15,485) in 1924, to 742,455 crowns ($198,978) in 1928; and in the two calendar years of 1927 and 1928 the total income of the company inclusive of the subsidies, increased from 1,146,225 crowns ($307,188) in 1927, to 1,229,186 crowns ($329,422) in 1928. (The Swedish crown ranges about $0.268 par.)

From the beginning, the Junkers all-metal planes have been used in Sweden, and this choice has proved very satisfactory. So far, not a single accident has occurred on the Swedish airlines. The planes originally in use on the lines operated by the Aerotransport had a loading capacity of 2,200 pounds, corresponding to ten passengers, baggage, and mail. Junkers, as well as Fokker and Dornier, however, has built planes with a considerably greater carrying capacity. Thus the giant Junkers G.31 has a carrying capacity of 4,400 pounds with an average speed for commercial purposes of 115 miles per hour. The tendency to develop larger planes with increased carrying capacity is of advantage to commercial aviation, because it increases also the earning capacity of the planes in service.

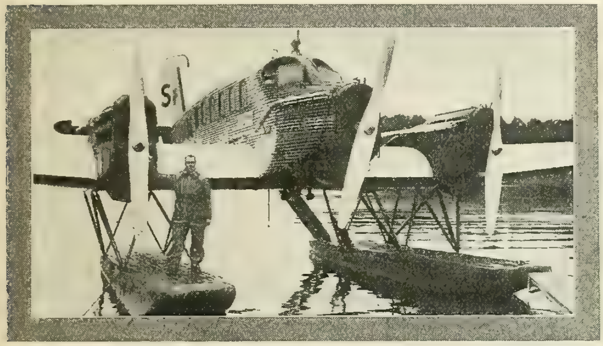
Placing a patient aboard a plane fitted for hospital service

The air service naturally is of particularly great importance to countries which, like Sweden, are situated on the outskirts of Europe and depend on slow steamship transportation for communication with the Continent. A few examples will illustrate this fact. The sea journey across the Baltic from Stockholm to Helsingfors requires approximately twenty-three hours, but now this distance can be covered by air in only three hours. It requires forty-eight hours to travel by boat and rail from Malmö to London and only ten hours along the present regular airline. This saving is of enormous value to business men and others in need of rapid transportation. Also the tourist traffic has been encouraged by the air service. Each year more foreign visitors have made use of the Swedish airlines.

Junkers mail plane operated on the Stockholm-London line

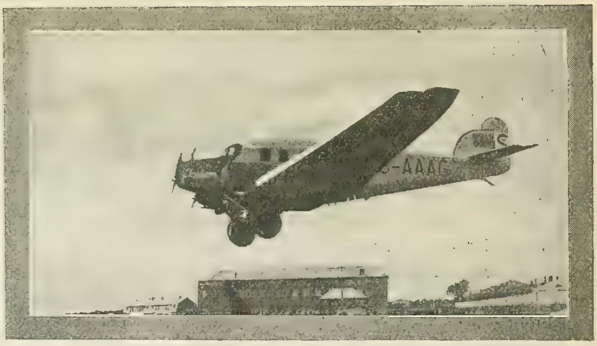
A benefit of still wider application is gained from the postal air service.

Several improvements in the Swedish air service are contemplated for the near future. At the present, the planes on the Malmö-Paris and the Malmö-London routes leave Malmö at 8:30 a.m. so as to connect with the incoming night trains from Stockholm, Gothenburg and Oslo, and arrive in Paris and London at 6:30 p.m. and 6 p.m., respectively. The Paris route is 745 miles long and is covered in eight flying hours; the London route, measuring 680 miles, requires half an hour less. In addition to the actual flying time, stops are made in Hamburg and Amsterdam, which consume together two hours. When, according to present prospects, planes with a speed of 125 miles per hour can be put into service, the journey will be shortened by two hours, and by reducing or eliminating the stops and advancing the hour of departure, it would be possible to reach Paris and London soon after the lunch hour. This would be of particular importance by allowing the mail to be distributed the day it arrives.


The "Uppland," a Junkers G. 34W equipped as a seaplane

Besides these changes and improvements in the service out of Malmö, there are plans for extending the traffic from Stockholm and for serving the important connections between Gothenburg and England. Insofar as Stockholm is concerned, the plans include all-year service on the route to Helsingfors, which would be of particular value since that city is ice-bound part of the year.

Some time ago an agreement was entered between the Aktb. Aerotransport and the Swedish government railroads under which air freight may be sent to or from a number of Swedish railway stations and foreign airports by means of a joint air and rail routing, the merchandise being moved by rail on routes where there are no airlines. By this means air freight from the Continent proper may be sent, not only to the major Swedish airports (Stockholm, Gothenburg and Malmö), but also to all the other chief cities of Sweden, and vice versa. Air freight rates per kilo, or 2.205 pounds, range from 0.95 crown (25 cents) on the Gothenburg-Berlin run, to 4.30 crowns ($1.05) on the Malmö-Moscow run. The rate from Malmö to Paris and to London is 2.40 crowns (64 cents), but to Copenhagen it is only 0.15 (4 cents).


A Swedish transport plane coming in for a landing at Hamburg

Insurance of air freight against damage or theft during transit (whether by air or rail), and reasonable charges for eventual recovery of the goods, are arranged for by the transport company at a premium of 0.25 per cent *ad valorem.*

The traffic on daily flying routes connecting Sweden with all neighboring countries and practically all important centers of Europe is now in full swing and with a growing number of passengers, according to reports issued by the Aktb. Aerotransport of Sweden.

The Aktb. Aerotransport, in order to stimulate the public interest in aviation, organized a propaganda flight in which a plane of the Junker F.13 type flew entirely around Sweden, and another Swedish flier made a similar tour in a DeHavilland Moth sport plane, covering a distance of about 4,350 miles in sixty hours' actual flying time without a mechanic and with an average fuel consumption of about five gallons of benzine per hour. This flight amply demonstrated the safety and dependability of flying, for every start and arrival during the long trip was made according to schedule and exactly on (*Continued on page* 246)

Aerial views of (left) the Malmö Stads flying station

ANOTHER PLANET HEARD FROM

By Don Rose

IT was while all good citizens were in the last days of repentance over their income taxes that the ninth member of the solar family turned up in the far corners of the sky and was duly reported in the newspapers. The incident caused quite a little excitement and helped to take our minds off our troubles at a time when the last straw was just about to break the camel's back. Men who were being torn this way and that by conscience and the current condition of the pocket book looked up from their income tax declarations and gave the new planet a cordial greeting. Individuals who were desperately trying to figure what the Government meant by Tax on Capital Gain and Loss, 12½ per cent of Column 8, Schedule D, gave it up and tackled the simpler problem of finding a planet which nobody could see in a place where nobody would think of looking for it. And folks like myself, who know what it is to have exemptions, felt like congratulating the sun as one man to another for digging up a ninth member of the family just when a big family means something beside a headache.

There was really a lot of excitement, which isn't surprising, since a ninth child is something in anybody's family. After it died down a bit, people began to ask each other what should be done with the new planet now that we've got it. There was the ticklish problem of giving it a name. Everybody who has tried to name a ninth child knows that it's a difficult and delicate operation, and to name a ninth planet to everybody's satisfaction is a terrific responsibility, particularly since everybody wants to help. The ancients paid their compliments to the gods and goddesses of their times by naming stars and constellations and planets after them, but that custom has gone somewhat out of fashion. It would hardly do to name this cosmic baby after current celebrities, such as President Hoover or Senator Borah or Mr. Wickersham, supposing it's that kind of a planet, nor after Elinor Smith or Ethel Barrymore or Peggy Joyce, supposing it isn't. It's bad enough to be godfather to a mountain or an irrigation dam; it would be just too much to have a planet named for you.

As we go to press the problem of the name is still unsettled, though it is reported that the President will appoint a commission to settle it, after which the Senate will do its best to ratify it without breaking a blood vessel. And in the meantime, other pressing planetary problems are crying for solution.

There is the question as to how to make this planet useful, not only to astronomers but to society in general and possibly to aviation in particular. The most obvious suggestion is to use it for parking space, which will relieve congestion on the city streets and deprive a lot of honest policemen [illegible] port. But my own idea is to [illegible] on their way from [illegible] and am [illegible] ntly [illegible] y

However, it may do it yet. I understand that we shall be hearing quite a lot from the rocket planes and engines, even if it's nothing but a mess of explosions. The nearer we get to the limit of speed, the more anxious we seem to go faster—much faster; and the more thoroughly we explore the earth, the more inquisitive we grow about the moon. So when the ordinary airplane has broken the last lingering record and visited the last far corner of the world, the rocket plane may take up the job and make neighbors of the planets and slow motion of a mere thousand miles an hour. It's impossible, of course, which is just why somebody will some day insist on doing it.

Another suggestion for the new planet is to turn it into an Old Folks Home for Admirals or a House of Correction for stock salesmen, insurance agents, communists, pessimists, and people who conduct prohibition polls. The latter named nuisances ought to be given right of way to the other end of the solar system at once, and supplied with enough postcards and pencils to poll each other once a week for a century or so. The only difficulty is that the new planet is probably not large enough to hold them all, and also may be a little particular about the company it keeps. Maybe it never heard of prohibition, and maybe it doesn't want to. And anyway, it probably doesn't want to be polled about it.

I have been suffering a little lately from writer's cramp, and couldn't at first account for it. It couldn't have come from my journalistic efforts, for I wring my daily bread from the death rattle of a typewriter, which blunts my fingers and shatters my nerves but couldn't possibly give me writer's cramp. Nor could it have come from writing checks, since I haven't written a check in three weeks and even then it was only a little one. I have discovered at last that it comes from filling out prohibition polls. I have been polled by first class mail and by second class females; I have signed up in subways, streets and cemeteries; I have voted in speakeasies and prayer meetings. I have signed on the dotted line and placed my mark where the accident occurred until there is no longer any fun in it. And I don't notice to date that it has made a particle of difference.

However, the public at large seems to have developed quite an appetite for polls and questionnaires, and perhaps we air-minded defenders of the faith should take a hint and make use of them. It might be possible to take a poll of public opinion which would tell us what the public wants and what it thinks of aviation and all its works. Twenty million people can't be wrong, though another twenty million may think so, and if we could just persuade twenty million of our fellow citizens to tell the truth about their aeronautical needs, preferences and intentions it would be a big help to the industry. It would tell the manufacturers whether to double their output or go into bankruptcy. It would tell the airport operators whether to put in more concrete runways or a planting of late potatoes. It would tell the students whether to stick it out or to go into some nice clean business like plastering or weather forecasting. And it would put the future of aviation on ice so far as the public is concerned, since the average citizen has been growing more and more trustful of postcard polls ever since the *Literary Digest* first invented the mail-order method of electing Presidents.

My ideas for this super-poll are roughly as follows, though you can go as far as you like and see if I care.

(1). Are you air-minded

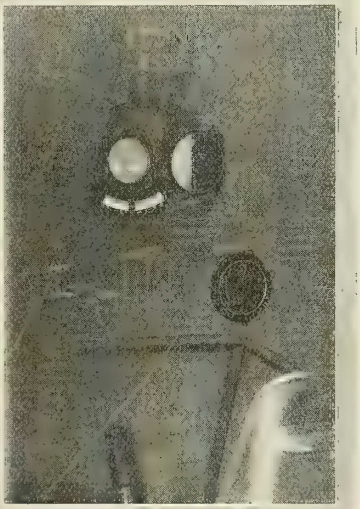
(*Continued on page 228*)

The Fairchild used for blind flight instruction by P. A. A. Standing beside it are Capt. Ocker and Chief Pilot Snyder

be a fairly stable ship, and the instruction generally progresses rapidly. When the chief pilot is satisfied the student pilot is capable, the latter proceeds to blind flight work in the company's big trimotored Fords and Fokkers.

The large transports offer no more difficult problems—in fact, are easier to fly blind than the small planes because they are less affected by gusty air.

The actual time of instruction varies with the individual pilot. Men generally get about eight hours of the blinded work before they are considered out of the student class. But the practice itself has no limit. The junior pilot is enabled to continue his instruction by flying the plane through cloud layers by instruments during the regular trips on the run, provided there is a ceiling of three thousand feet and conditions otherwise are favorable.



Instrument board in the cabin of the plane used for instructing in blind flying

From the opening days of the Mexican service of the Cia Mexicana de Aviacion (as the Mexican Division of Pan American Airways was named and is still known despite the change in name to accord with its expanded place in the international Pan American Airways system), the flight to Mexico City involved a certain amount of blind flying.

Mexico City spreads itself in the valley of Mexico, that vast oval basin, fifty miles long and forty miles broad, which is thought to have been at one time the floor of an extinct volcano, the walls of which are the mountain ranges now encircling it. Its area of 1,758 square miles varies in elevation from 7,400 feet to 8,000 feet above sea level. The valley is usually clear. But climbing up from the coastal oil center, Tampico, the pilots would face thick fleecy cloud layers which bulked up at times to accumulations 2,000 and 3,000 feet in depth. They had to climb on up through these clouds, and cross the Sierra Madre Oriental range which juts up to nearly two miles. On the flight to Tampico, they would fly a compass course off the plateau, across the range, and then go down through the clouds, knowing they had a ceiling adequate for safety, and find themselves along the coast at the desired point.

The developing of the blinded flight instruction method has thus been going on for nearly three years. Its success has largely been the result of the work of Chief Pilot E. J. Snyder and Operations Manager D. G. Richardson, who have had the assistance of Captain Ocker. Richardson, by the way, was one of Ocker's students at Gerstner Field during the war, and a half dozen or more Army pilots claim the credit of having taught Snyder.

On April 15, 1928, an air mail and passenger line was inaugurated with a Wasp Fairchild between Tampico, Tuxpam and Mexico City. On at least fifty per cent of the trips some cloud or fog flying was necessary in order to keep a fairly good schedule. Thus the pilots who pioneered on this line became accustomed to flying by instruments.

After considerable experience, the pilots would take of in the thickest fog at Tampico, climb through to the top, and continue on to Mexico City without the slightest difficulty. This was found to be easier than flying blind at high altitude due to the density of the air at sea level and better performance of the plane. Some difficulty was experienced, however, at times when visibility was fifty or seventy-five yards, the fog being so thick that it was hard to steer a straight enough take-off to stay within the bounds of the narrow runway which the Tampico field afforded.

The blind flight education of Pan American pilots has not been without its thrills. An experience of one of the older pilots who came down through some thousands of feet of clouds out of control and attained such speed that both his ailerons (Friez type) were blown off along with seventy per cent of the rudder surface, including the counterbalances, strengthened the company's feeling that a regular training in blind flying was imperative. This particular pilot broke through the clouds with enough ceiling to enable him to right his plane by the elevators and what remained of his rudder and made a landing of sorts.

Another time a Fairchild FC-2 took off from Tampico with no ceiling and climbed to 8,000 feet, being in solid clouds continuously. At this altitude, control of the ship was lost, the plane falling in three consecutive spins down to 2,000 feet where it was righted. Being unable to return to Tampico because of the low ceiling, the pilot continued on his course to Mexico climbing up through to the top of the clouds which were 10,000 feet high.

The result of the Pan American Airways blinded flight training is that today its pilots can recover quickly and surely from most positions. Indeed, there is little to indicate that the pilot in the blinded compartment is flying and not the man in front who can see out.

No man is eligible for promotion to first pilot until he has 300 hours on the trimotors and until the chief pilot makes three round-trips with him after he is OK'd before turning the ship over to him as first pilot. These three trips mean about twenty-five hours more time. First pilots are required to have a total logged time of better than 2,000 hours.

Although the Pan American Airways system encounters no conditions elsewhere to rival those on its Mexican Division, except perhaps on its Andes crossings on the South American Buenos Aires-Santiago flights, A. A. Priester, its chief engineer, has adopted the blinded flight course as a part of the requirement for all Pan American Airways pilots.

The method is thorough and adequate, except for the basic limitation imposed by the absence of an artificial horizon instrument. It keeps Pan American Airways pilots from getting into trouble. It can make flying safer everywhere. And it will be even more valuable when the horizon device is commercially manufactured.

HEAD WORK IN THE AIR

By Ralph W. Cram

IT was a bright October morning—the 22nd, 1929—and there was nothing unusual about the flight of a four-passenger cabin plane that had taken off from Cram Field at Davenport, Iowa, until a few people who were watching it saw something fall out of the plane. Was someone jumping with a parachute? But no chute opened, and whatever had dropped fell rapidly to the ground, a mile and a half from the field.

Attention of those who saw the incident was then diverted to the plane, which at once went into an easy glide to the field. It had about 1,500 feet of altitude at the start, made the field easily and floated to an easy landing. Out jumped its pilot and three happy students, the youngsters glad to get back to earth perhaps, but still more tickled because they had joined a group of fliers even more select than the Caterpillar Club—a group still unorganized and unnamed, comprised of pilots who had gone into the air with an engine and come back safely without one.

The object which had fallen into a farmyard over a mile from the field was the airplane's motor. But let Kenneth (Red) Hunter, pilot of the plane, tell the story:

"We were flying along smoothly at about 1,500 feet, when suddenly there was a pop, the plane went over a little on one wing, and my left foot slipped off the rudder bar. Sounded to me like a piston or two was gone. I got the foot back and leveled the plane, pushed her nose down, and then saw there was neither prop nor motor in front of me. The three boys in with me came forward a bit, we kept her at a speedy glide toward the field, and that was all there was to it."

Examination of the prop later showed it had broken off close to the hub, on one side, the pull of the remaining half having jerked the engine clean from the plane, leaving the controls intact. The broken half of the prop was later found a quarter of a mile from the engine.

"Red" Hunter is chief pilot at Cram Field. If you asked him where and how he learned to fly, he is apt to tell you that his brothers taught him, here and there. One of them, John, is flying night mail between Cleveland and Louisville; Walter is likewise flying mail, St. Louis to Omaha; and Albert is "flying around home." Red himself was one of the mystery pilots of the Chicago *I Will* plane which in October last made a try for the refueling endurance record but was forced down by fog after eleven days in the air. The students with him on his engineless landing were Ray Hansen of North Dakota, Sam Benjamin of Davenport and Norman Blake of Maine.

Leave It to the Pilot

IT seems to me the incident is important as an answer to the question, "Should the air passenger worry if the motor hesitates, or even if it quits; or if the plane casts a wheel; or if, perhaps, the engine drops out; or, should he be traveling lighter-than-air, if the gas bag pops?"

Offhand, one might say the passenger should feel some concern. In the May, 1926, AERO DIGEST I wrote an article expressing my attitude under the title "Leave It to the Pilot"—and in time that has passed since then, I have had no reason to change this opinion.

Of course, there will always be—in this generation at least—people who think it is all over if an airplane engine goes dead. For my own part, in ten years of flying I have never known one to quit while I was in the air. But they have been known to, and in that case it is well to have some altitude. I would be the last to suggest that anyone go into the air with a stuttering engine, or stay aloft after a warning that the engine was not functioning 100 per cent; but I do wish to present some evidence that the prospective air traveler is not by any means doomed when "something goes wrong" with motor or plane or gasbag. A lot of very healthy people can relate interesting experiences to prove the contrary.

Major R. W. Schroeder, known to his intimates as "Shorty" because he is anything but short—can tell a couple of them.

There is the historic incident, known to all who are acquainted with the history of altitude flights, of the Major's climb to 33,114 feet, February 27, 1920, when his oxygen failed and he fainted just after nosing the plane toward earth and leaning forward to cut off the switch. He did cut the motor, it was afterward learned; and after the plane dropped five miles he recovered sufficiently to straighten out his plane and make a good enough landing, on McCook Field. They found him there, flier and machine ice-encrusted, his eyes frozen wide open; and he got well and has done a lot of good piloting since then.

Landing Sans Two Motors and Undercarriage

FOR instance—and I think this the better story—the Major was at the wheel of a trimotor ship in the second National Air Tour, in 1926, cruising along at about 200 feet in the neighborhood of Galva, Ohio. All at once an explosion on the pilot's right shook the ship. At a glance he saw that the right engine had disappeared. Shoving the other two throttles wide open, he tried the controls, found them operating satisfactorily, and carried on toward Cleveland.

Kenneth (Spoons) Boedecker, the Wright engine man, was aboard, and he climbed forward and said, "Shorty, the right motor is gone and it took all of the right half of the landing gear with it."

"Okay," said the Major, and told Spoons to shut off the gas on the right tank to the right engine.

No sooner said than done, and the plane made another mile when the left engine began vibrating badly; oil pouring out between the cowling. Schroeder then shut down the left motor, and stretched the glide with the center engine to a small field beyond some woods that then lay under the plane. Boedecker hurried forward again with "Anything I can do," and was told to "tell everybody we are going to set down a little rough; to brace themselves and cover their faces." This Boedecker did, and then put his back to Schroeder's and waited. Shorty kicked her sidewise as she neared the field, to side-swipe the other half of the landing gear and knock it off so he could set her down on the large flat metal bottom of the fuselage. All worked out as planned, showing what can be done with a trimotor from 200 feet even if two motors go bad. Of the several passengers and crew, no one got a scratch. They repaired the ship and flew it to the National Air Races at Philadelphia three weeks later.

"Old 'Spoons' Boedecker was the man of the hour (or minute) on that trip," says Major Schroeder, "and I want to say right here that you never know a man until you get him in a tight place. 'Spoons' came through with flying colors, and I believe we

(*Continued on page* 250)

SOME NOTES ON BEACH FLYING

By Dr. Ralph Greene

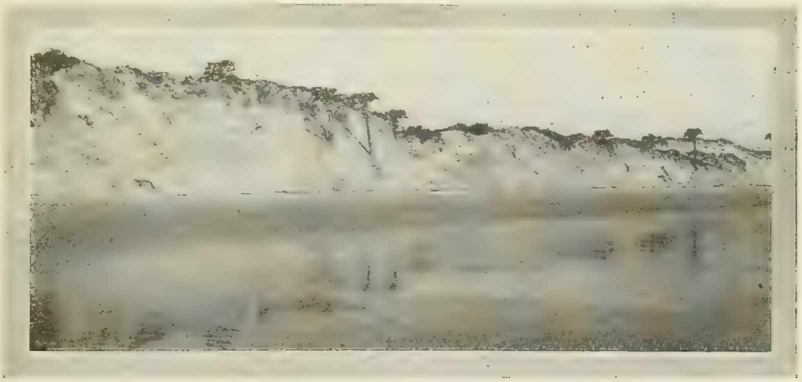
IN the main, this article is designed to give something in the way of a simple explanation of beach flying, the ultimate aim being to describe the various factors involved in this sort of flying and to clarify some misapprehensions concerning it.

There are many pilots who are known as beach fliers, but there is a decided paucity of beach fliers, in the strict sense of the term. Indeed, beach flying is an art that can be attained only through plenty of experience. It is, to put it mildly, very tricky. Fliers from the interior will very likely doubt the statement that it takes unusual skill and practice to indulge successfully in beach flying, as compared to any other type of flying. This statement is made advisedly, giving due credit to those pilots who have proved their mettle in executing cross-wind, down-wind and other unusual types of landings at airports in the interior. My purpose is to offer some suggestions to pilots who may have occasion to use the Florida beaches, with which I am most familiar.

The first factor to consider is the landing strip itself. White sand, near the water, is the best on which to land because of the fact that sand near the water is packed hard, especially if the tide is going out. At this location the tail skid does not dig in as it does on ordinary turf, and an airplane will ground-loop with the slightest cross-wind. Red or pink sand must be avoided, if possible, because it is invariably soft and might easily cause a nose-over.

Next, of course, is the method of beach landing. It is best to land as near the water as possible, without going in the water. To do this, one must use rudder and power to keep the ship away from the water. Salt water rapidly corrodes steel tubing. If the airplane does go into the salt water, it should be thoroughly rinsed with fresh water as soon as possible.

Jacksonville Beach near Jacksonville, Florida, is a good example of a beach suitable for flying purposes. Upon this particular beach Stinson and Haldeman broke a world's record for non-refueling, endurance flying. Lee Shoenhair recently made several world's weight - carrying records over Jacksonville Beach, Florida. On the Florida Atlantic beaches when the wind is anywhere east of north, or east of south, one may fly with ease and safety. Flying conditions are very pleasant. The air coming off the water is cool, sustained and smooth, and acts as a cushion for a quick take-off, a rapid climb and satisfactory landing.


A typical strip suitable for beach flying along the Atlantic side of the Florida coast

Considering the negative aspect of flight conditions on these beaches, one must remember that if the wind is from the west, southwest or northwest it is better to refrain from flying until the occurrence of an east wind. Advice against flying the beach in a west wind is urgently offered by pilots with abundant experience. Yet one may fly an airplane equipped with wheel brakes with a somewhate greater degree of safety with a west wind. When the wind is from the west, air coming off the land is always turbulent Sand dunes are banked up along the beach. They may be comparatively high and extend inland only a few feet, or they may be rolling and extend several hundred yards toward the interior. The rolling formation causes rough air by setting up sinuous, wave-like air currents. This particular air condition may cause a ship to settle from twenty to fifty feet, and even more, if the wind is particularly strong. This wind action has caused a great many flying accidents. Pilots have tried to come in over the water towards the beach and have undershot and landed in the water when they encountered the almost ever-present down draft. Other pilots have overshot the beach and hit the sand dunes head on. Attempts to land in a cross-wind have been more often unsuccessful than otherwise, and the ships have usually washed off a wing. In landing up or down the beach with a west wind, the plane is forced to land on a beach sloping east towards the water. A wing is of necessity up into the wind on the west and damage is easily incurred. Attempting to land higher up the beach, a cross-wind landing in a west wind, frequently results in the ship's ground-looping into the sand dunes. Ground loops, however, are generally started when a blast of wind passes a break in the dunes.

Under such adverse circumstances, the best procedure for getting on is as follows:

First, fly the beach at a safe altitude, preferably seventy-five to a hundred feet.

Second, pick out a strip where the sand dunes are lowest. If possible, choose an unbroken dune, because breaks in the sand dunes produce so-called chimney drafts.

Third, land as close to the water as is possible, always, of course, maintaining sufficient speed for adequate control.

Fourth, as speed declines, keep gunning the ship to the water so you may stop near it.

And, finally, be intensely alert for a rapid ground-loop even at five or ten miles an hour, since that is the critical period of a landing.

Sometimes one may find a beach along an inlet at a point where it is possible to land into a west wind. In such a case, one is fortunate; but he must remember that beach sand along inlets is loosely packed and is not as hard as that on the ocean side, and a nose-over is potentially imminent in soft sand of this kind.

In conclusion, one generalization appears to be appropriate. If there is a wind blowing from the west at the rate of ten or fifteen miles per hour, fly with caution. If one attempts to land in a strong west wind on the Atlantic Florida beaches, there is a grave possibility that a landing accident will occur.

TWO-WAY RADIO COMMUNICATION IN AIR TRANSPORT SERVICE

By

Herbert Hoover Jr.

Radio Technician, Western Air Express

THE development of two-way radio communication between airplanes and the ground has opened up an entirely new field for progress in the air transport industry. The greatest benefit from this type of radio will undoubtedly be in scheduled transport service, and therefore its most intensive use will be in this branch of the industry. It will, in time, also be of much value to taxi, itinerant and private fliers, although the need for immediate use is not as great among the latter as it is among the former.

There are two distinct steps in applying two-way radio communication to air transportation. First, it is necessary to solve the engineering problems in regard to choice of wave-lengths, development of apparatus, suppression of ignition interference, installation on the aircraft and location of the ground stations. Second, methods of operation and control must be evolved to fit the particular needs of air transport service. The discussion that follows briefly covers the first phase of the problem; next month the second phase, dealing with some of the principles of operation that are involved, will be presented.

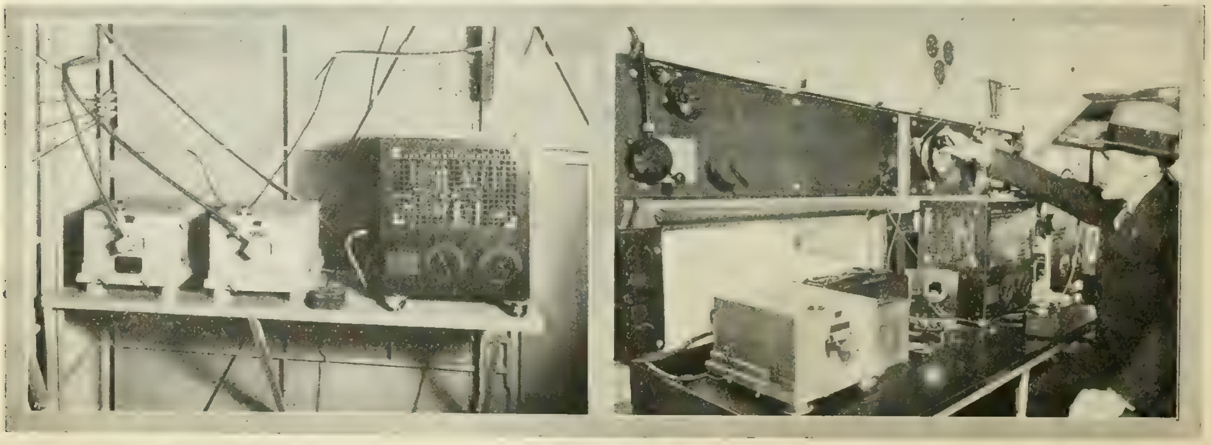
The first intensive experimental work on two-way communication between planes and the ground was probably done during the war by the Army and Navy in coöperation with several of the large research laboratories and the Bureau of Standards. As a result, equipment was produced which was suitable for military and naval requirements at that time. Then, a range of twenty-five or even fifty miles could be obtained with radio telephone, and perhaps a hundred miles with telegraph. With the end of the war period, practically all research stopped, and it was not until ten years later, in 1928 and 1929, that work on this phase of radio was again started by the commercial manufacturers of apparatus in anticipation of the requirements of the transport operators. During the intervening period, great advances had been made in other branches of radio, particularly broadcast transmission and reception. It was therefore possible to design and construct far more powerful and efficient equipment than had previously been available for aircraft use. Moreover, the useful band of wave-lengths had been vastly increased by making use of short waves.

Before the manufacturers of equipment and the transport operators could begin development work on apparatus, it was necessary to decide what band of wave-lengths could be used. The experience that had been gained in the past had all been on medium or long waves, and all indications were that these were the best and most suitable for air transport work. Practically all of the available channels in this part of the spectrum were in use, however, and the majority of the transport operators were forced to look elsewhere. A number of short waves had been set aside for the aircraft industry by the Federal Radio Commission, and it was in this region that the development work was undertaken.

It was claimed in advance that these waves were erratic and unreliable, that suitable apparatus could not be developed, and that the general method of operation would be impractical. After the experimental work had been completed, however, it was found that the first problem could be overcome by solving the second and third—that is, consistent performance was possible when the right type of apparatus was properly installed and operated.

Extensive flying tests were necessary to determine which of the available short-wave channels were most suited to aircraft operation, what were the most efficient type of antennas, the amount of power required on the planes, and the location and amount of power required at the ground stations.

The determination of the most suitable wave-lengths was largely a matter of compromise to meet certain practical limitations that had to be imposed on the system. These limitations were, first, that the trailing wire antenna on aircraft should be eliminated if some form of fixed antenna could be substituted; second, that the ground stations should preferably be located at the main airports along the route (about 200 to 300 miles apart), and third, that continuous and uninterrupted communication should be possible both day and night with the nearest airport.

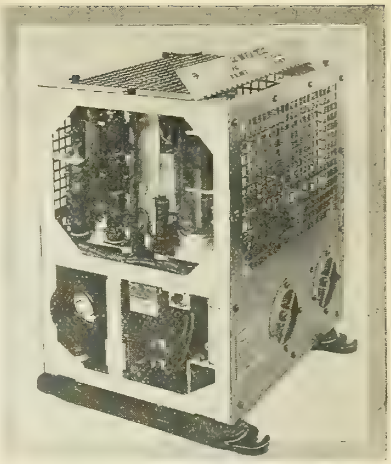


Courtesy of Western Electric Co.

(Left) Radio telephone installation in a Fokker F-32 of Western Air Express, showing short-wave transmitter and two remotely controlled receivers. (Right) Interior of Bell Telpehone Laboratories' Ford trimotor used in developing radio equipment

Courtesy of Western Electric Co.

Wind-driven generator for supplying power for airplane radio equipment



Courtesy of Western Electric Co.

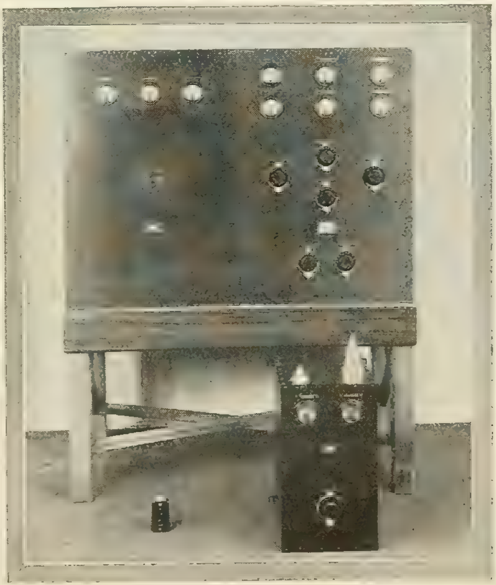
Short-wave radio telephone transmitter with one of its side covers removed

In meeting these operating restrictions, it was found that waves above approximately 110 meters could not be used efficiently with small fixed antennas, and that, on the other hand, waves below a certain point would "skip"—that is, a dead spot would occur in which no signals could be heard at all. In daylight wave-lengths down to about 45 meters could be used before a skip effect began to be noticed, whereas at night all wave-lengths below about 80 meters were effected by this phenomenon. If a channel was desired for daylight operation only, considerably better results could be obtained in the vicinity of 50 meters than of 100 meters. On the other hand, if a single channel was desired for both day and night flying, then the choice was limited to between 80 and 110 meters. Daylight operation on the latter band was satisfactory as long as the ground stations were not spaced more than about 200 to 250 miles apart, and on condition that fairly large fixed antennas could be erected on the aircraft which were to be flown over the route. Some of the transport operators flying small single-motored mail ships, which in turn restricted the size of the fixed antenna, found it necessary to use two separate wave-lengths, one near 50 meters for daylight communication, and the other near 90 meters for night use.

A trailing wire antenna with weight attached does not appear to be as objectionable to some transport operators as it does to others. Better radio results can be obtained with a trailing wire than with a fixed antenna, in which case wave-lengths up to 200 meters can be used very efficiently in both daylight and darkness.

The type of fixed antenna usually employed is a single wire running from each wing tip back to the vertical stabilizer, and from that point forward to the radio transmitter. One of the great advantages of this type of antenna is that no reeling in and out is necessary before landing or taking off. Another advantage is that an overall check of the transmitter and antenna is possible at an airport before the plane takes off, and furthermore, communication can be maintained while the ship is flying very low or has landed at some isolated intermediate field.

Radio telephone, rather than telegraph, has been chosen by the majority of the transport operators as the means of communication, because it gives the pilots a degree of direct contact and assurance that comes only when they themselves are able to talk with their own ground organizations. Telephone apparatus is heavier, more expensive and somewhat more complicated in construction than telegraph, but counteracting this, a separate radio operator is not necessary and the overall weight and expense, as a result of this fact, are less.



Courtesy of Western Electric Co.

Mercury vapor rectifier, short-wave transmitter, remote control switch and tuning unit for a ground station

On some transport systems, particularly those flying over water with relatively long distances between operations bases, telegraph is undoubtedly the most suited means of communication. Pan American Airways have developed an especially reliable system of operation based on telegraph, and it is understood that not a single ship has been lost since its installation about a year ago.

The radio telephone equipment now commercially available weighs about 150 pounds, including power supply, when installed in the average transport airplane. An output power of 50 watts, if fully modulated, appears to fulfill all the requirements on the plane, while 400 watts, if fully modulated, will cover the requirements on the ground.

There are three general methods at present in use for obtaining power for the transmitter. First a dynamotor may be used which operates off the 12-volt storage battery of the plane; second, a high voltage generator may be driven directly by one of the plane's engines; or third, a wind-driven generator may furnish the necessary power. None of these methods is entirely satisfactory, and there will undoubtedly be new developments in the future which will be better adapted to aerial transport service.

The radio apparatus is so designed that it may all be installed in the rear of the ship, and remotely controlled from the pilot's cockpit. The usual equipment in a transport plane comprises a long-wave receiver for picking up the services broadcast by the Department of Commerce, and a short-wave transmitter and receiver for communication with the stations of the transport company along the route which is to be flown. The receivers are controlled in the usual way by a remote tuning dial and volume control, whereas the transmitter is placed in operation by pushing a button located on the top of the microphone. After a small amount of

(Continued on page 278)

DURATION FLIGHTS DURING 1929

By H. B. Henrickson

Aeronautic Instruments Section
National Bureau of Standards

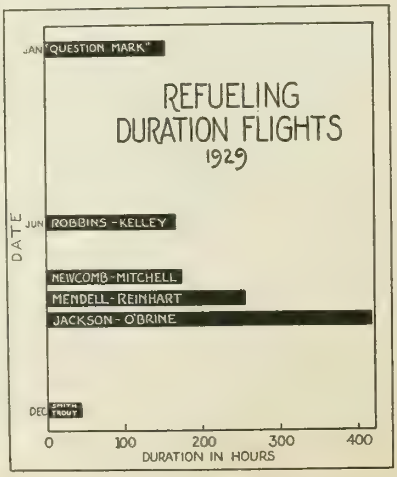
DURING the year 1929 a number of interesting duration flights were made. The competition during the early part of the year was especially keen among the women pilots in their solo duration attempts, and later among the men pilots in refueling endurance trials. New marks were made and then bettered in rapid succession throughout the year. Refueling duration flights were especially numerous, the world's record having been officially exceeded five times during the year—in each case by American pilots. All of the flights were interesting, many of them spectacular, but most certainly the feature of the year was the flight made by Jackson and O'Brine who surprised the world by remaining aloft for 420 hours and 17 minutes. This record for refueling in flight probably will remain unbeaten for a long time.

The record for duration without refueling was not exceeded during the year. Attention was given mainly to refueling flights. As a result, the world's record of sixty-five hours and twenty-five minutes without refueling still remains with the famous pilots Risztics and Zimmerman of Germany. The women's duration trials of the first half year, unfortunately, must be considered as miscellaneous records only, because until June 17, 1929, the Federation Aeronautique Internationale (F.A.I.) did not have any category for such performances. As a result, only flights made subsequent to that date may be credited as official records. At the present writing the recognized non-fueling duration record for women is held by Mme. Maryse Bastie, of France, who established on July 28, 1929, a duration of twenty-six hours, forty-seven minutes and thirty seconds.

The first flight of the year was that of the *Question Mark*, an Army trimotored Fokker monoplane powered with three Wright Whirlwind engines of 225 horsepower each. This famous landplane, the performance of which was probably responsible for the many refueling flights which followed, took off on New Year's Day from the Los Angeles Metropolitan Airport, California, on a refueling duration trial. Aboard were five men—Major Carl Spatz in command, Captain Ira C. Eaker, Lieut. H. A. Halverson, Lieut. E. R. Quesada, and Sergeant Roy Hooe. Attending the *Question Mark* were two refueling ships, Douglas Transports No. 1 and No. 2, each powered with a single Liberty motor of 400 horsepower. Each refueling plane was equipped with two 150-gallon gasoline tanks, and one 40-gallon oil tank which were located in the passenger compartment. The gas tanks were joined by a four-inch pipe to which was fastened a fifty-foot hose with a diameter of two and one-half inches. Ropes were used for the purpose of lowering to the *Question Mark* the necessary supplies of food, water and messages. In all, thirty-seven successful contacts were made on this famous flight during which more than 5,000 gallons of gas, 250 gallons of oil, and 2,000 pounds of supplies were taken aboard. After circling the coast of California from Los Angeles to San Diego for about a week, the ship was at length forced to land at its home port because of the failure of one of its engines. On subsequent inspection, the trouble was found to be the result of excessive wear on the valve stems at the point of contact with the rocker arms. The landing was made on January 7th, after the ship had remained in the air long enough to exceed all former records by a large margin. Two sealed barographs installed in the ship recorded the many ups and downs of the plane during the entire flight. The design of the instruments was such that the clockwork could be wound from the outside of the case at intervals during the flight. As a result, there was no break in the smoked chart record due to the running-down of the clockwork. Unfortunately, in all subsequent refueling flights, this detail was not provided for. The flight, as shown by the barograph records, was made at altitudes that varied continuously, being at higher levels during the night and at lower levels during the day, with a maximum altitude of 7,000 feet. The distinct, continuous, but somewhat broad trace on the barograph charts indicated that no intermediate landing had been made during the flight, which was officially timed at 150 hours, 40 minutes, and 14 seconds. This refueling-in-flight duration record with a return to the point of departure was at that time the greatest ever recorded for any type of aircraft in the history of aviation.

In order to establish any new world's duration record, it is necessary, according to the rules of the Federation Aeronautique Internationale, to raise the previous record by at least one hour. At the close of an endurance flight, the barograph is removed from the plane by an official observer who represents the National Aeronautic Association, which in turn is the representative of the F.A.I. in this country. The instrument then is sent to the Bureau of Standards in Washington, D. C., where, in the presence of a member of the contest committee of the N.A.A. the lead seal is broken. Following this the trace on the camphor-smoked chart is examined for intermediate landings that might have been made by the ship. The smoked chart record, after being fixed by immersing in a solution of collodion in Duco thinner, is replaced on the barograph drum. Next the clockwork is wound and started running, and the flight time

Dale Jackson and Forest O'Brine



Graph of record refueling flights, 1929

interval as recorded by the duration trace is carefully checked against a standard timepiece. This determination, of course, is merely a check on the duration time accurately observed by the N.A.A. official at the field who timed the start and finish of the flight to the second. A high grade stop watch is used which has been certified as to rate in accordance with F.A.I. requirements.

On January 2nd, while the *Question Mark* was making its duration trial, Miss Evelyn Trout took off from the Los Angeles Metropolitan Airport in an attempt to win the women's solo duration record. Her ship was a Golden Eagle monoplane powered with a LeBlond five-cylinder sixty-horsepower radial motor. The aim was to exceed the former duration time set by Miss Viola Gentry of Roosevelt Field, New York. Miss Trout circled the Metropolitan Airport at Van Nuys, apparently without unusual fatigue until she estimated that the fuel must be running low, and then she landed. The flight terminated early in the evening of the day that she took off, and incidently, it was her first experience in a night landing. At this time an unofficial women's record of twelve hours and eleven minutes was established.

On January 30th, Miss Elinor Smith of Long Island, New York, took off from Curtiss Field in a solo duration flight. Her attempt to win duration record was made in a Brunner-Winkle Bird biplane, powered with a Curtiss OX-5 motor of ninety horsepower. The take-off with 112 gallons of gasoline was made early in the afternoon, and Miss Smith cruised back and forth over the Long Island flying fields while parents and friends kept watch from below.

After it grew dark, the air became very cold, and the flying atmosphere was rough, but the motor continued to function perfectly. About midnight, Lieut. James Doolittle in a Vought Corsair flew under her plane and landed. She watched him with keen interest and decided to follow his technique when her time should come, for this would be her first night landing. Upon noticing the lights blinking at Mitchel Field below, the young flier thought that it must be a signal for her to land. Consequently about 3:30 in the morning, on January 31st, she gave the prearranged signal with a Very flare gun and came on down to a successful landing. She had set a new women's duration time of thirteen hours, sixteen minutes, and forty-five seconds.

On February 10th, Miss Evelyn Trout took off once more in an effort to regain her duration honors. She started from Mines Field, Los Angeles, California, at about 5 o'clock in the afternoon in her Golden Eagle monoplane. After prolonging her flight through the night, apparently without excessive discomfort, she landed the next morning, February 11th, with a new record, having remained in the air for seventeen hours, five minutes and seventeen seconds.

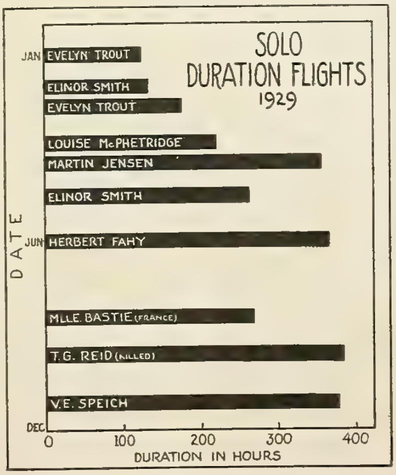
On March 16th, Louise McPhetridge Thaden, former holder of the women's altitude record of 20,270 feet, took off from Oakland Airport, California, in a solo duration attempt. She piloted a Travel Air biplane powered with a Hispano-Suiza engine of 180 horsepower. Her start was rather hazardous in that the take-off was made with 196 gallons of gas and without any provision for dumping the load in case of an emergency. However, the get-away proved successful. The duration flight took place over a twelve-mile course at altitudes that varied continuously, attaining 1,700 feet as a maximum. Principally because of a dangerous drowsiness, she landed safely on March 17th with twelve gallons of gas unused. This established a new duration mark for women—twenty-two hours, three minutes, and twelve seconds. Exceeding as it did the former women's record by approximately five hours, it began to look as if Miss Trout and Miss Smith had a formidable competitor.

Shortly after dawn on March 27th, Martin Jensen of trans-Pacific fame, took the air from Roosevelt Field in a solo duration trial, piloting the Bellanca monoplane *Green Flash*. The ship was equipped with a Wright Whirlwind engine of 225 horsepower, the fuel being ordinary auto gasoline. Jensen's purpose was to demonstrate that one could remain aloft for extended periods without the use of a special fuel. His flight, once the minor troubles at take-off were remedied, continued steadily during the day and night. At length, because of an attack of irresistible drowsiness, he was forced to land at Roosevelt Field, late in the afternoon of March 29th. His time was thirty-five hours, thirty-three minutes, and twenty seconds which was but eight minutes longer than that set by the late Royal Thomas, May 3rd, 1928.

On April 23rd, Miss Elinor Smith, this time piloting a Bellanca monoplane powered with a Wright Whirlwind engine of 225 horsepower, took off in a solo flight from Roosevelt Field, New York, with 210 gallons of gasoline. Since the plane, as well as the pilot, was known for its duration qualities, the performance expectations ran high. Miss Smith sought to exceed the twenty-two-hour mark established by Louise McPhetridge. With a start at almost noon, she cruised leisurely over the fields of Long Island during the afternoon and evening with the motor well throttled and functioning perfectly. The weather conditions were good, much better than those during her former flight. On the afternoon of the day following she successfully landed the big cabin monoplane, achieving a new solo duration mark for women, having remained in the air for twenty-six hours, twenty-one minutes, and thirty-two seconds.

On May 19th, Reginald Robbins and James Kelley took off in a refueling duration flight from Fort Worth, Texas. Their ship was a rebuilt Ryan monoplane, the *Fort Worth*, with a single Wright Whirlwind engine. The plane as well as the motor, had already seen much service. Both of the pilots were hardly more than amateurs in the flying game—Jim Kelley being a former

(*Continued on page 272*)



Graph of solo duration flights, 1929

Vern E. Speich

AIR—HOT AND OTHERWISE

Corroborating Our Estimate
Britain Thinks
Safety? Yes!
The N. A. A. Again

By Frank A. Tichenor

PERHAPS no article appearing in AERO DIGEST has ever met with such universal and unqualified approval from the industry as that published last month directing general attention to the waste involved in all this show stuff. Everybody recognized it as the truth. That one big show a year would suffice, is the general consensus of opinion.

Big centers which desire and deserve shows can have them—each one in its turn. Taking them that way, with a year between each, they'll be worth having. Profit producers and not flops. Sanely distributed geographically, as the years pass, every section in due course of time would have its chance at the Big Tent, while individual localities could have as many local shows as they felt energetic enough to organize and prosperous enough to afford. Such local exhibitions always help. But let them remain local.

A statistician who should be in a position to know reports that it cost the industry over half a million dollars to stage the St. Louis show. No visible evidence exists to prove that there was any tangible return. Approximately $60,000 was spent for space, the gate receipts were just about two-thirds of that. Results? Have you heard of any real sales? It is up to the Chamber of Commerce Show Committee to stop this drain upon the industry.

BRITAIN is not so slow in some matters as we are fond of believing her to be. She has many men of worth, as, for instance, Commander Sir Charles Dennistoun Burney. He has laid out an Empire Air Program which, if carried out, would make the balance of the world gasp with admiration and then struggle to compete for some semblance of prosperity comparable to that which his plan certainly would give the British Empire. He does not deny that the cost would be enormous, and he admits that subsidies would be essential; but he is probably quite accurate in his visualization of that which the splendid and ambitious plan would do for the British Empire.

He wants regularly flown and virtually continuous air service between Great Britain and each of her dominions and colonies, and feels sure that these outlying portions of the Empire would cheerfully share the burden if the motherland initiated. He frankly admits that the defense of the British Isles now is the concern of the Royal Air Force—not the navy.

That is as true of the United States but we haven't the pull and organization, yet; we haven't the steelmakers and the vast brass-buttoned cohorts strongly enough behind us in all parts of the world to make an international meeting, like the present London Conference, switch its actual efforts so as to make it evident, as it is now, that if reduction is accomplished it will not be by the curious method of the construction of more ships.

Sir Charles suggests the amalgamation of the British Royal Air Force and the navy with emphasis on the air force, feeling certain that elimination of overlapping costs would save $50,000,000 annually, which amount, if devoted to air communications, soon would link the Empire in a network of aerial bonds. Within ten years, he thinks, air passenger service should exist between the mother country and each of the dominions.

Sir Charles has an exaggerated idea of what America is doing. We need his suggestion even more than Britain does. Where is the prophet to arise in Congress as he has risen in the British Parliament and announce this, backing that announcement with a practical plan?

THE safety campaign that started in the United States Aviation Underwriters' office is sweeping the industry like a forest fire. Or no; I don't mean that; this campaign is beneficent. Everyone today is talking safety, having begun to realize that the engineering accomplishments of the industry never will realize their full significance until the needless accidents, such as have occurred with startling frequency of late, have been avoided. This epidemic of disasters can be stopped by proper mental medicine for some and a little elemination of others of the personnel. It lies within the power of company executives to stop it instantly. The leaders of the industry have broadcast the statement that they are ready to give one hundred per cent of their influence toward this end. However, speaking generally, this statement comes from the top. To be made effective it must be energetically backed up by the executives. They have the real power, whether it be in airline operation, or any other business.

We all must realize that aircraft have certain limitations. When these are exceeded disaster must follow. By consultation among ourselves we can find out what they are. Then we can either find out how to remove them or adopt such regulations as will prevent them from being overstepped If the industry in its entirety, from its chiefs to its mechanics, will get back of Colonel Young, of the Department of Commerce, and enforce the rules now existing, creating such new ones as we know (or soon will find out) are needed, dangerous hazards will be reduced to the vanishing point. When these preventable threats are thus lessened, air accidents will not be so frequent among newspaper headline exhibits.

THESE thoughts upon the subject of making aviation safe for our democracy carries my mind back to Florida, where I recently spent a few weeks, while there visiting the Pan American airport. There for the first time I saw real application of the safety management idea. In operations its development is 100 per cent; in maintenance 100 per cent plus. The much praised European airports could learn much from the Pan American's port at Miami and what has been done at Miami has been as well done at Havana and elsewhere. Here we find radio control in every detail and all precautions and refinements of precautions.

Pan American knows that safety brings cash customers. Hundreds of visitors from all parts of the country go to this airport as sightseers but purchase tickets for air travel obviously as the direct result of the visibly good work done by Eaton and Chenea and their carefully selected group of associates.

The average person with the price wants to and will fly if he can be convinced that the operators are running a transportation line and not a circus. It would pay every group engaged in air transport in this country to send at least one executive down to Miami to look over the successful operation of this company which flies 85,000 miles per week, and which has

(*Continued on page* 240)

TREND of AERONAUTICS in EUROPE

By Anthony H. G. Fokker

Consulting Engineer, Fokker Aircraft Corporation

NO airline in Europe is as close to fundamental economic success as are many airlines in the United States. The mistake of most European manufacturers was in relying too much on subsidies. They built their businesses in a fashion to get the most out of the subsidy, not in a fashion to get the most out of the basic commercial possibilities of the situation. They neglected the real commercial needs of the territories they served. As a result, now that European governments are reducing their air subsidies, the manufacturers and the operators find themselves in difficulties. They have no more subsidy on which to rely for their profits; and they have not developed a strictly commercial business.

Anthony H. G. Fokker

Fortunately, the situation in the United States is exactly the reverse. Our manufacturers, in close coöperation with the operators of our transport lines, have gone ahead to develop the actual economic needs of aviation in this country. They have found they can get people to ride the lines if the rates are reasonably comparable to railroad fares, considering the increased speed and comfort of the airlines. Now, if the Watres bill is passed by Congress and signed by President Hoover, it will not be a subsidy, but a Governmental payment for a service of proved worth.

Take Germany for example. There the lines expanded in all directions under the favor of government subsidies. Now that the subsidy has been withdrawn, many of these lines find that there is not the real commercial business to support them, and many of them have been discontinued. That is why you will hear that European passenger business is falling off this year. On the lines where there is real need of service, business is good and increasing; but the total number of passengers has declined because the total number of passenger services has declined.

France, Belgium and Italy are in a slightly different situation. There the manufacturers catered to military needs first and then tried to adapt their military planes to transport business. The result has not been entirely happy. In an effort to improve the situation, the largest licensees for the manufacture of our strictly commercial Fokker planes are now building them in Belgium, France and Italy. For instance, forty Fokker planes are being built in Belgium for service in the Congo.

Many firms which do not pay a royalty are also constructing the trimotor transport type. This is especially true in France, Italy and Russia. The French lines recognize that they cannot continue commercial business with their present converted military types. Great strides have been made in Russia in the development of commercial air transportation in trimotor ships. There, of course, the vast distances and inadequate railroad services produce a growing demand for commercial aviation.

The one advantage Europe seems to have gained from its subsidy system lies in the development of airports that this has made possible. In regard to principal airports and emergency landing fields, I think they are ahead of us. Tempelhof in Berlin, Le Bourget, Croydon and Amsterdam provide examples of what I mean. But soon America's main airports, developed under the auspices of municipalities, as well as under private auspices, will excel in size and efficiency anything in Europe, with the possible single exception of Tempelhof. The location of that field, almost in the center of a metropolitan city, will in all probability be unduplicated for quite some time. In Europe only the British and the Dutch planes have radio equipment equaling the new American system.

Any advantages that may be attributed to the European subsidy system, then, are far outweighed by the results of the wiser course we have followed in this country, as evidenced in the Watres bill. Under the plan there proposed, Government funds are paid out for aviation, it is true, but it is not accurate to speak of it as a subsidy. It is payment for an air mail service of definitely proved value.

During my stay in Europe I saw many big new airplanes. They are all experimental. They are beautiful engineering developments along mechanical or aerodynamical lines, but all of them suffer from the lack of larger power units and most of them seem to imply economic corollaries as yet beyond our experience.

I am frankly doubtful as to whether there is yet the economic need in passengers and in freight for units so large that they will require very special means for handling. The development of such transports as the F-32, it seems to me, represent a sounder path of economic trend. It is a more reasonable step from the three-engine to the four-engine ship, from twelve passengers to thirty. It increases the payload by 150 per cent at an increased cost of but fifty per cent.

This it does without unduly increasing the cost of subsidiary factors. A ship of this size can be flown off any airport used by our present transport planes. It can be handled without specially trained pilots. In other words, it brings into its economic equation none of the factors that might disastrously affect the financially successful operation of larger units.

There seems to be a notable trend in Europe away from all-metal construction and back to wood and fabric. The Luft Hansa in Germany is reducing the number of its all-metal ships and substituting ships of wood and fabric. Operators have found that ships of that type of construction are economical, long wearing and safe.

Operations in the Dutch East Indies are growing very rapidly, and the operators find that the wooden wings, tubular steel fuselages and fabric covers of their Fokker planes admirably withstand the stresses of tropical weather with its great heat and high humidity. Their experience is duplicated by that of the Dutch navy, whose officers report a distinct preference for the wood wings of the Fokker type.

European experience seems to show that the limit has about been reached in the horsepower of air-cooled engines. Such engines of greater than 500 horsepower require a cooling area that produces more head resistance than can be compensated for by the increased horsepower and weight. The answer, of

(*Continued on page 226*)

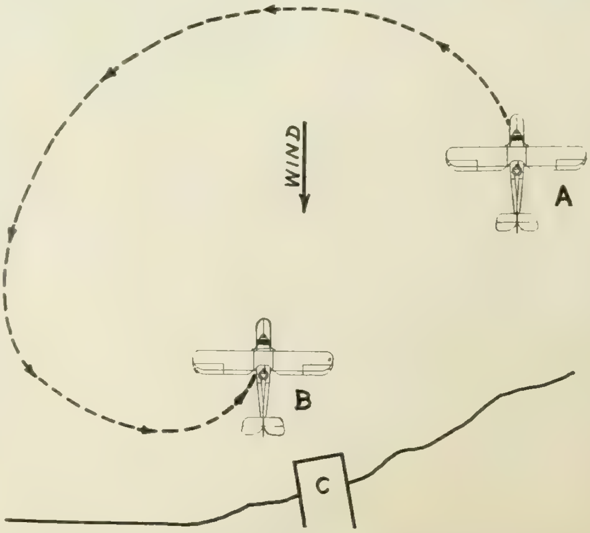
The Navy's new Ford seaplane running at high speed on the after part of the floats with the nose high, before being put on the step for the take-off

AIRCRAFT SEAMANSHIP

By Lieut. L. A. Moebus, U.S.N.

DURING a recent cross-country flight, I was forced to land on an Army emergency field because of severe storms ahead. A few minutes later a formation of Army planes landed for the same reason. The usual shop talk soon followed, during which one of the Army pilots asked many questions as to why seaplanes act as they do on the water. He explained that, during the past summer, he had been granted leave of absence which he devoted to commercial flying with a company just organized to operate seaplanes on the Great Lakes and the Canadian waterways. None of the pilots had ever been in a seaplane, and the only information that they could obtain was from an article on the water handling of seaplanes by George B. Post that had been published in AERO DIGEST. With the assistance of this article, S. O. S.'s to motor boats and plenty of throttle, the detachment completed three months of operation away from a base, without any serious damage to the planes. But in spite of the practical experience obtained, there were still many misgivings as to the proper methods of handling a ship on the water.

The thought then occurred to me that there would probably be many more instances in which experienced landplane pilots would find it desirable or necessary to handle a seaplane without previous instruction or guidance, and that a further article explaining some of the fundamentals of aircraft seamanship would be of assistance in filling the gap caused by lack of practical instruction. It was for this purpose that the following was written.



In approaching a dock with a moderate onshore wind, the plane should be taxied from the landing position A in a wide circle to position B and then sailed back to the dock C. When the wind is blowing only slightly or not at all, it is safe to taxi directly to the dock.

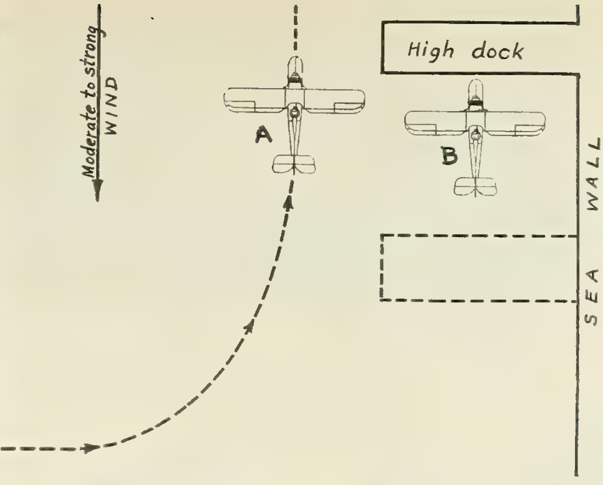
A seaplane, with the engine idling or stopped, will swing into the wind. Unless the pilot thoroughly realizes this tendency, he will be embarrassed at the most inopportune times.

At all times during taxying or sailing, the stick or wheel should be held all the way back, lifting the nose of the plane as high out of the water as possible. In addition to reducing the pounding of the water and the amount of spray set up, a better rudder effect is obtained in this way. As little power as possible should be used to accomplish the evolution desired. Although some pilots imagine it looks thrilling to taxy a plane on the step, to do so is nevertheless poor seamanship.

To turn a single-float or hull seaplane (which in nearly all cases is provided with small wing tip floats) out of the wind, apply full rudder and use the ailerons as necessary to drag the wing tip float on the side towards which the turn is being made; and use sufficient power to make the turn. The wing tip float should be dragged over the surface of the water but not permitted to bury itself; otherwise the same effect as a ground loop may result. With a twin-engine single-hull plane, the turn can be made more effectively by applying power to the opposite engine only and using the ailerons as necessary to keep the plane on an even keel. In this case, both wing tip floats are kept out of the water.

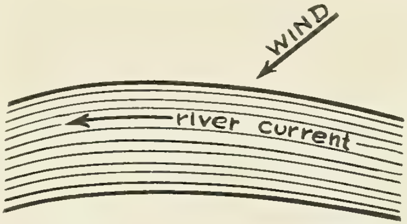
A twin-float single-engine plane is the most difficult of all types to turn out of the wind. With a plane of this type, full rudder and opposite ailerons are used and sufficient throttle is given to make the turn. In strong winds, this usually means full throttle. The nose of the plane must be kept as high out of the water as possible. The turn to the *right* can be made more quickly by suddenly throttling down the engine after considerable speed has been obtained and the turn has been started. As soon as the rate of turn reduces, the throttle is advanced again. The reason for this method is that it utilizes the speed obtained without having the turn retarded by the torque of the engine.

To taxy a course out of the wind, the engine is throttled down from the amount needed to make the turn, to that just sufficient to enable the pilot to maintain a steady course. To head back into the wind, use the controls as would be done to make a turn in the same direction, and *idle* the motor. Most beginners make the mistake of using power when trying to get back into the wind. To taxy directly down-wind after once headed in that direction, throttle down the motor considerably more than on any course except directly up-wind. Unless it is absolutely necessary, a plane should never be taxied directly down-wind toward any object which might damage the plane, because it may be caught "in irons" and drift down-wind for a considerable distance in spite of all that can be done to change the course. If it is necessary to taxi to a down-wind hazard, it is much safer to make the approach with the wind far enough around on one side to assure the plane's swinging into the wind as soon as the engine is idled. In strong winds the preferable method of approaching the hazard is by sailing the plane to the desired position rather than by taxying to it.



When approaching dock with wind along shore, plane should be taxied to position A and line passed to dock. The engine should then be stopped and the plane allowed to drift down clear of dock, after which it can be hauled to position B.

To take off, permit the ship to head into the wind by idling the engine. Start the take-off by opening the throttle with the stick all the way back. The ship will pull well up on the after part of the float, with the nose high out of the water. After the nose is as high as it will come, move the controls forward as far as necessary for the plane to rock forward on the step. Once on the step, the plane is flown off the water. In light powerful seaplanes the nose is not pulled up quite so high, and in putting the plane on the step, care must be taken that the nose of the float is not dropped far enough to permit it to dig into the water. If the plane is heavy or underpowered, it will be necessary to hold the controls all the way forward while the plane gradually works forward on to the step. As a last resort, when difficulty is encountered in getting on the step, run into shallow water and rock the plane backwards and forwards with the controls.



When landing on a river, the pilot can usually disregard the current and land as if the water were dead. If there is no wind, he should land with the current of the river.

In rough water, difficulty is seldom encountered in getting sufficient speed for the take-off. In rough water take-offs, the nose of the plane must be held sufficiently high to prevent the possibility of the plane's burying its nose in a wave.

The plane is taken off in a stalling attitude in rough water. After getting the plane on the step in very smooth or glassy water, it is sometimes necessary suddenly to yank the plane into the air to overcome the suction of the floats or hull in the water. The plane is, of course, in or near a stalling attitude after such a take-off and must be handled accordingly.

Take-offs in heavy ground swells usually require a long run during which the plane receives considerable pounding. Ground swells should be avoided whenever possible.

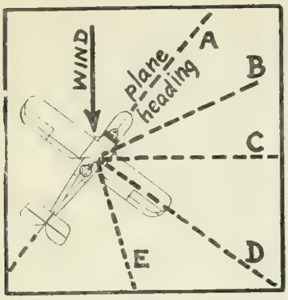
For normal landings, the plane is landed into the wind as is a landplane. Where other wind indicators are not available, wind streaks on the water are used to determine the direction of the wind. These are white streaks which can be clearly seen, running, in the majority of cases, ninety degrees to the trough of the waves. They indicate the path of the surface wind but not the up-wind or down-wind directions. The latter must be determined by some other method such as drift or, when there are white caps on the waves, by the direction in which the crests of the waves are being blown.

For rough water landings, the plane is headed directly into the wind as determined by the wind streaks, completely stalled and dropped in from just above the crests of the waves.

A normal landing should not be attempted in glassy water. A power stall landing is used in this case. In this type of landing, the plane is brought down to an altitude known to be absolutely well clear of the surface of the water as judged by the tops of trees, buildings, etc., at the water's edge and the throttle adjusted so that the plane with the nose *up* is gradually losing altitude. It is held in this attitude until it touches the water when the throttle is closed and the plane handled as in a normal landing. Care must be taken in power stall landings to avoid stalling the plane, for with the nose up and the plane losing altitude, very little excess is maintained above the stalling speed. By its nature, a power stall landing covers a considerable distance, but it is the only method that the pilot can use to assure him-

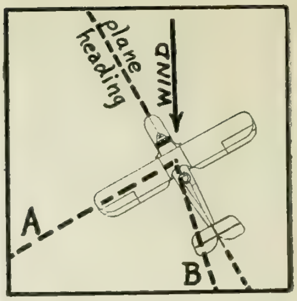
Twin-float Fairchild taxying to a mooring

On the step; a Loening about to take off.



Sailing diagram: The plane will travel course A, B, C, D or E by varying the engine speed slightly from that which would hold the plane over one point if headed directly into wind.

Making a turn with a single-float Vought Corsair; note wing tip float is dragging on the side toward which plane is turning

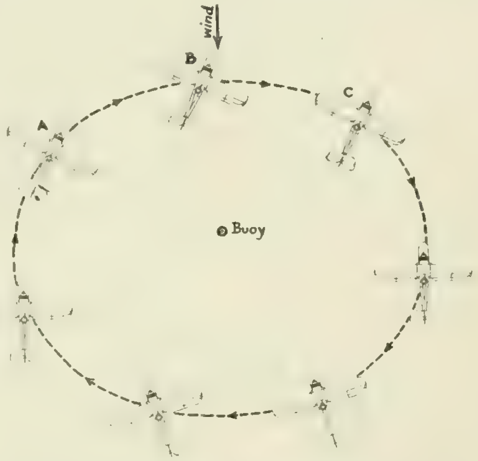


With engine speed slightly below that which would hold the plane over a fixed spot if headed into the wind, the plane will travel toward A. With the engine stopped, it will drift toward B.

self that he is not being deceived by the glassy water. In the power stall, as in all other seaplane landings, the controls are kept all the way back after touching the water until the plane has lost its forward speed.

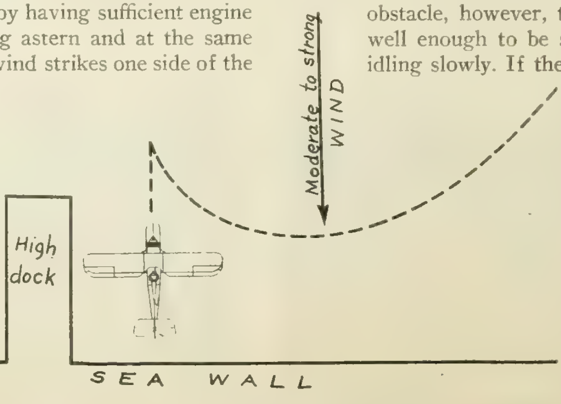
Sailing is undoubtedly the phase of seaplane water handling most difficult to master, and it cannot be utilized effectively by a novice without considerable practice. Because of its importance, however, for the benefit of those who must make a virtue of necessity by teaching themselves, the fundamentals are given here.

In a moderate to strong wind with the engine idling at the lowest speed, the plane will drift slowly down-wind when it is headed directly into the wind. If the engine is slowly turned up, a speed will be reached at which the plane remains directly over one spot just as though it were anchored. Then, if the controls are applied in the same manner that would result in a right turn if the engine were turned up sufficiently, the nose of the plane will swing from twenty to thirty degrees to the right of its previous position. The same principle applies of course if it is desired to move the plane to the left of its former position. As the engine speed is slightly increased, the plane will move to the side and at the same time it will be moving slowly ahead. It is apparent, therefore, that the plane can readily be moved from one fixed spot to any other point up-wind and to either side of the first position. In other words, by having sufficient engine to prevent the plane from drifting astern and at the same time turning the ship so that the wind strikes one side of the fuselage, the force of the wind against the side of the plane forces it to move away from the side presented to the wind.



Sailing a circle around a buoy: Dotted line and arrows indicate actual course and direction of travel. At A, B and C, the plane remains in the same position relative to the wind. Other positions are result of changes in amount of power used.

Now if the engine is throttled slightly below the speed that would give an effective course ninety degrees from the wind, the plane will still move to the same side but will also drift slowly downwind. By varying the amount of throttle a very small amount it is possible to obtain any desired effective course.



With an onshore wind this dock approach is inadvisable, because in loading passengers or supplies the plane is apt to be damaged by the sea wall or high dock. It is better to moor or anchor the plane well clear of the dock and use a boat.

If, however, the engine is throttled down to such an extent that the plane begins to drift back rapidly with the nose turned out of the wind, a speed through the water will be obtained which will give a keel effect to the hull or floats that will make the plane tend to drift in the direction in which the tail is pointed, even though the wind striking the side of the plane is attempting to move it in the opposite direction. By swinging the nose as far as it will go out of the wind and permitting the plane to drift rapidly with the engine idling or stopped, it is possible to obtain an effective course as much as ten degrees from down-wind. This drift from the down-wind course seems small, but it is frequently quite important in avoiding obstacles while drifting with a dead stick or in attempting to sail down-wind to a particular point. In this case, the drift will be in a direction between the down-wind direction and the direction in which the tail is pointing.

In attempting to shoot a dock, runway, or other point located in a general down-wind direction from the plane, it is advisable to reach the point by sailing rather than by taxying, if the wind is at all fresh. During the sailing process, the nose is at all times fairly close to the wind and the drift relatively slow. If the pilot sees that he is getting in a bad position, a slight burst of throttle will pull him clear and he can repeat the attempt. In sailing down-wind to an obstacle, however, the pilot must know his engine well enough to be sure that it will not stop while idling slowly. If the engine will not idle sufficiently low or the wind is not strong enough to permit drifting slowly down-wind, little can be accomplished by sailing. One of the best exercises in the practice of sailing is to sail a circle around a buoy.

To pick up a buoy, taxy or sail the plane to a position directly down-wind from the buoy and turn up the engine sufficently just to creep ahead. The plane can be readily steered efficiently to permit the buoy to scrape alongside.

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AL WILLIAMS

MR. BRITTEN, Chairman of the House Naval Affairs Committee, has asked the Naval authorities to explain why "Al" Williams, greatest ace ever developed in the Navy, has resigned his commission in our nautical fighting forces. If the Navy were a baseball club, or a commercial organization, it would have pawned its shirt rather than lose this gallant and skillful member of its personnel.

We feel that we should tell the naturally annoyed inquirer that he will get only a perfunctory statement from the Navy. Under the rules, he will be told, Williams had to take his turn at sea-duty, but that irked him. No exceptions, he will be told, can be made by such important individuals as those who boss the ships on which we have spent millions with the hope, established in pre-air days, that they would assure our national safety.

The Congressman might ask in the same quarter why the Navy has produced no man capable of competently filling the shoes of Admiral Moffett. To such a query, also, he might be told that admirals, like lieutenants, must take their turns in going to sea, and that Moffett, knowing air, is now too wise to pin his faith to those surface ships which were the nation's only hope when he was younger.

This admiral, unlike some others, has progressed with the passing of the years. In his case, as in that of Williams, there lies the unpardonable sin against the Navy rules. The sailorman who sees the light which the Wright brothers set burning down at Kitty Hawk is taboo in the Navy of this nation.

We wonder just how long the people will willingly continue to pay for such a naval retroactiveness. For the time the nation has lost Al Williams in its national defense personnel. If it needs him he will return to it, of course; that is the impulse and tradition of such men as he. The Navy hasn't got his scalp; it only thinks it has. It thought it had Moffett's. AERO DIGEST long ago explained that many of the admirals were on the trail of this magnificent old sailor. But the people, understanding his real worth, got back of him. Secretary Adams sent his nomination to the President, and Mr. Hoover, by naming him, put a stop to the conspiracy.

Now what ought to be done for Williams, who is younger but who nevertheless has actually accomplished more for national defense, through aeronautics, than the combined service of ninety per cent of the last quarter century's admirals? If Moffett had not been at the London Naval pow-wow, the Navy bureaucrats never could have slipped their sly stilettos between Williams' ribs.

It is tragic to be forced to say so, but Williams will gain through having left the Navy. If Byrd had stuck to the archaic institution, he would not be ADMIRAL Byrd, and his expedition to the Antarctic as well as his flight over the North Pole never would have occurred. Williams, too, is capable of doing big things. Now that he has left the Navy he will have a chance of doing them.

FRANCE SEES LIGHT AHEAD

FRANCE does not exactly see another war on the horizon, but she is convinced that a good way to keep such dark clouds out of her line of vision is to be ready to meet the storm if it should come. She, therefore, has copied us and adopted a five-year program, but there is this difference: the French five-year program will be carried out. She is to devote the tidy sum of $132,000,000 to aviation and the fortification of her frontiers during the next sixty months. During the debate involved in this grim resolution to spend until it hurts, experts made clear the dangers which may threaten from chemical warfare plus aviation. For this France proposes to be perfectly prepared at a time when procedures in our Congress plainly intimate that we, of the United States, scarcely realize that our old ocean barriers lost their effectiveness forever when Lindbergh flew the sea. An interesting detail of the spirited debate which attended this astonishing procedure in Paris at a time so close upon the date of the Naval Conference in London, was the protest of many members that protection of frontiers by fortifications has become useless in these days when great planes may carry incredibly powerful explosives and gases of a dreadful deadliness. Deputy Emile Faure summed up the discussion with "the next war will be made by airplanes carrying gas and bombs—what good will these fortifications be against them."

RETURN OF A PRECIOUS RELIC

IF the Naval Conference in London accomplishes nothing except fruition of Senator Robinson's plan for the return of the first Wright plane, that history-making machine which flew at Kitty Hawk upon the memorable day which saw man's first successful effort to fly with a heavier-than-air device, it will have performed a service useful to this nation. In the minds of many good Americans, Senator Robinson's work in this matter will offset any failure he may make in an effort to reduce to sanity the world's naval mania.

Orville Wright acted quite properly when he refused to permit the mistaken Smithsonian Institution, in Washington, to perpetrate on his achievement the indignity of refusing it the credit it had earned, and by so doing taught the management of the Smithsonian and the nation wherein it abides, how unfortunate it really was.

Under those circumstances, the historic plane belonged wherever its creator wished to place it. The Smithsonian had forfeited it.

Now, with the American institution properly censured into a semblance of good sense, it will be fine to have that old plane back again, even if the delegates to the Naval Conference bring back nothing else.

FOOLISH LEGISLATION

TALKING about safety naturally leads to talk of accidents, their prevention and the ideas of those who would make American flying safe by legislation.

It may be trite but there is a well-known species who rush in where angels fear to tread. Amendments to the legislation proposed for the promotion of safe flying, offered by Senators McKellar and Bratton, somehow bring the proverb into mind. McKellar would remove the word "serious" from before the word "accidents" so that official statements probably would be required of the Secretary of Commerce even in mishaps involving minor cuts and bruises such as are common in the daily work of, say, a field mechanic. The cost of putting this proposal into effect would be startling.

If no one stops Senator Bratton his contribution to the foolishness of aircraft regulatory law will be an amendment, which he believes, in his ignorance and profound lack of understanding, would add to knowledge about the causes of mishaps. His plan provides for a $5,000 fine or a three-year prison term for anyone who removes from the site of an accident, prior to official inspection of the scene, "any evidence of value with respect to the cause" . . . and so on.

How well would this plan work if, for instance, an accident occurred on the runway of an active airport? Or if a plane fell in a busy city street? Representatives of the Secretary of Commerce are not always immediately available at all places, or even to be had for hours or days, or possibly even a week.

Aviation needs the right kind of legislation. Heaven forefend that it be made the target for the fool shots of fanatics, as have so many other of our life activities.

IMPORTANT FACTS FOR THE POST OFFICE TO CONSIDER

MUCH is wrong with the Post Office Department plans for the development of our Latin American air mail. The Post Office wishes to use the $1,500,000 asked from the Appropriations Committee of the House, not for the completion of the air mail service from Miami down the east coast of South America, as generally desired by our exporters, but for making west coast trips more frequently extending slightly the Buenos Aires—Rio plans and establishing an airline penetrating Canada.

This is an entirely unsatisfactory plan and the Post Office Department claims to the effect that South American needs are covered by the extension from Buenos Aires to Rio are not justified in fact. Such a scheme would provide a service so slow as to be useless in reaching Rio.

There are several large cities north of Rio which, if touched, would give our business men much trade in a vast region wherein we now work at a great disadvantage because of imperfect mail facilities. Several large South American cities of this region will soon be placed by a French service nearer to Europe than our best plans will place them to our own United States.

American business needs and demands an air mail route making the east coast of South America efficiently accessible. If real danger exists that the $1,500,000 necessary for the east coast route is to be eliminated or deferred, the President should (and no doubt will) appoint a special commission to look into the Post Office Department plans. American manufacturers, threatened with the loss of a potential market, surely will request this service of the President, and he, in his wisdom, will grant it gladly.

GENERAL GILMORE RETIRES FROM THE ARMY AIR CORPS

RAPID, marked and highly satisfactory changes have occurred at Wright Field since it has been under the command of General Foulois. This bettered situation is discussed freely by those in the industry who deal with the Government at this great airport. The place no longer is a dank, dark mystery, but in every way is functioning so as to collaborate with those who have business with its various departments.

A year and more ago we prophesied that, with General Fechet as Chief of the Air Corps and General Foulois associated with him, we should have a combination that would eliminate doubt as to what might be going on at Wright Field. General Foulois has been in charge only a short time, but morale has so changed already that we are justified in feeling certain that even greater improvements will be forthcoming.

Each era in America's public service witnesses a small proportion of ideal incumbents. Fechet and Foulois are examples of this particular time's fine contributions to the roster of our official human assets.

And while writing of the fine prospects now shining over Wright Field, it comes to mind that General Gilmore, formerly in charge there, has handed in his resignation as of June 30.

CONGRESSMAN JAMES' ILLNESS

AS a result of overwork, Congressman W. Frank James, chairman of the House Military Affairs Committee, is confined to the Walter Reed Hospital in Washington. To an extent unparallelled in our recent history, he has given his time and strength unstintedly to investigation of the Army's true relationship to national defense.

Congressional recesses have meant nothing to him during the past five years. When most Congressmen went home to fix political fences and to rest, Congressman James has departed on new journeys to study Army conditions. Making these trips always by air, he has been able to cover distances unimaginable to the ordinary traveling legislator. He knows, for he has personally seen, what is going on from Panama to Alaska and from the West Coast to the Atlantic Seaboard. No other individual in America is as familiar with the Army's actual conditions as this enlightened lawmaker, and because he knows the possibilities of aviation through his experience as an air traveler, he has with frequent success and high patriotism been able to fight the battles of the Air Corps. It is the wish of AERO DIGEST that his recovery may be speedy and complete, and we believe we voice the wish of the men in the Army as well as those of the Air Corps.

SALES BY KNOCKING

SOME airplane salesmen think they can sell their products by knocking those of others. As a matter of fact, every salesman marketing any type of plane ought first to devote his energies to selling aviation, reserving his boosts of his especial line for the later chapters of his discourse. At shows and elsewhere during recent months we have encountered too many knockers. They accomplish no good for themselves, for their product, for their employers or for aviation.

ALL-AMERICAN AIRCRAFT SHOW

Detroit City Airport, Detroit, Michigan, April 5-13

THE third annual All-American Aircraft Show is being held April 5-13 in the new hangar and exhibition building recently completed at a cost of $1,000,000 at the municipal airport, Detroit, Mich. The exhibition is sanctioned by the Aeronautical Chamber of Commerce of America, Inc., and is sponsored by the Detroit Board of Commerce. Ray Cooper, manager of the show, and a committee of twenty of which Edward S. Evans is chairman, will supervise the exhibition, in coöperation with the staff of the Aeronautical Chamber of Commerce.

On the opening day, the program of activities includes ceremonies dedicating the new building. The show building has been designed especially for aircraft exhibition purposes and has been located adjacent to the airport so that exhibitors may fly their planes to the show instead of crating and shipping them, land at the field, and demonstrate their planes without leaving the show grounds during the exhibition. Special parking space has been arranged for planes which will be demonstrated, and the show management has drafted a set of traffic regulations governing all aircraft at the field during the show. Planes will be required to land counter-clockwise after circling the field once. Stall take-offs, climbing turns and flying at an altitude less than 1,000 feet will be prohibited. Starters will control take-offs and landings.

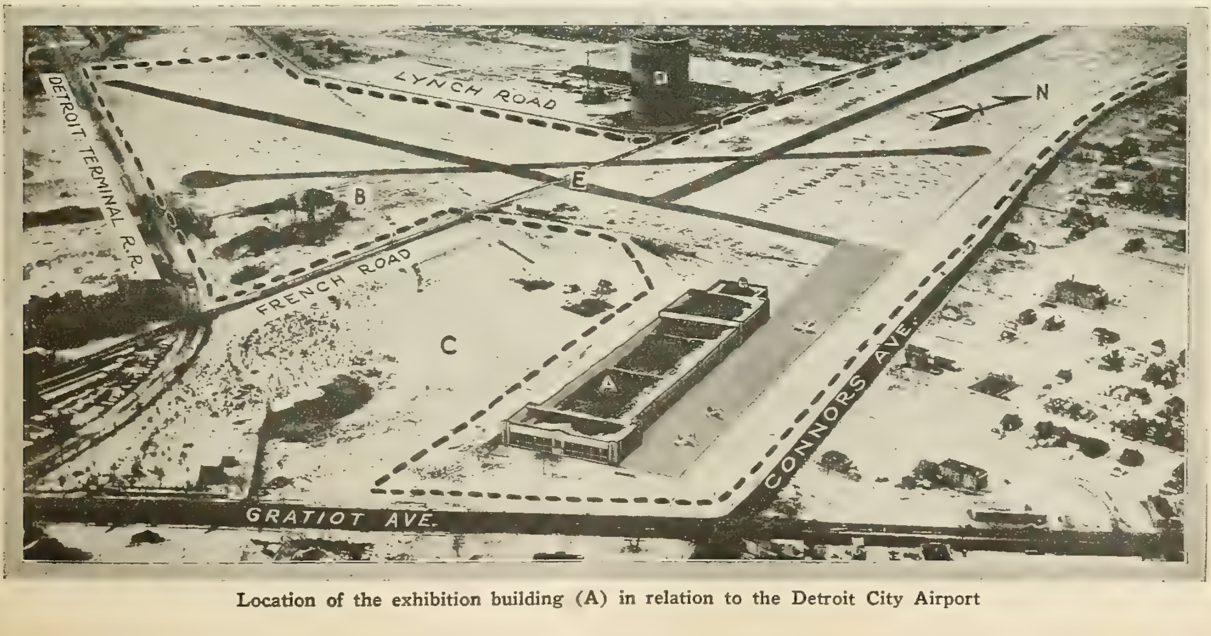
The exhibition building is 1,000 feet in length and 200 feet wide. Entrance doors 100 feet in width are provided so that planes of any size may be wheeled into the exhibition hall from the field without being dismantled. The municipal airport is five miles from the city hall. Parking space has been provided for motorists attending the exhibition, and a special bus service to the field has been arranged. There is street car service to the entrance of the airport.

The exhibitions of aircraft and accessories are laid out according to the plan of a city, with the names of airways replacing the names of streets. Each exhibitor is assigned an address on one of the airways which are named after men prominent in the history of aeronautics. There are between 90 and 100 aircraft exhibited and approximately 110 exhibitors of aeronautical accessories. Included in the aircraft which are being shown at the All-American exhibition are the Fokker F-32 which will occupy a 16,000-foot space; three Ford trimotor transports, including the Ford club plane; the twenty-three-place Keystone Patrician; the fourteen-place Sikorsky amphibion; and the Ogden Osprey, a light six-place trimotor cabin monoplane.

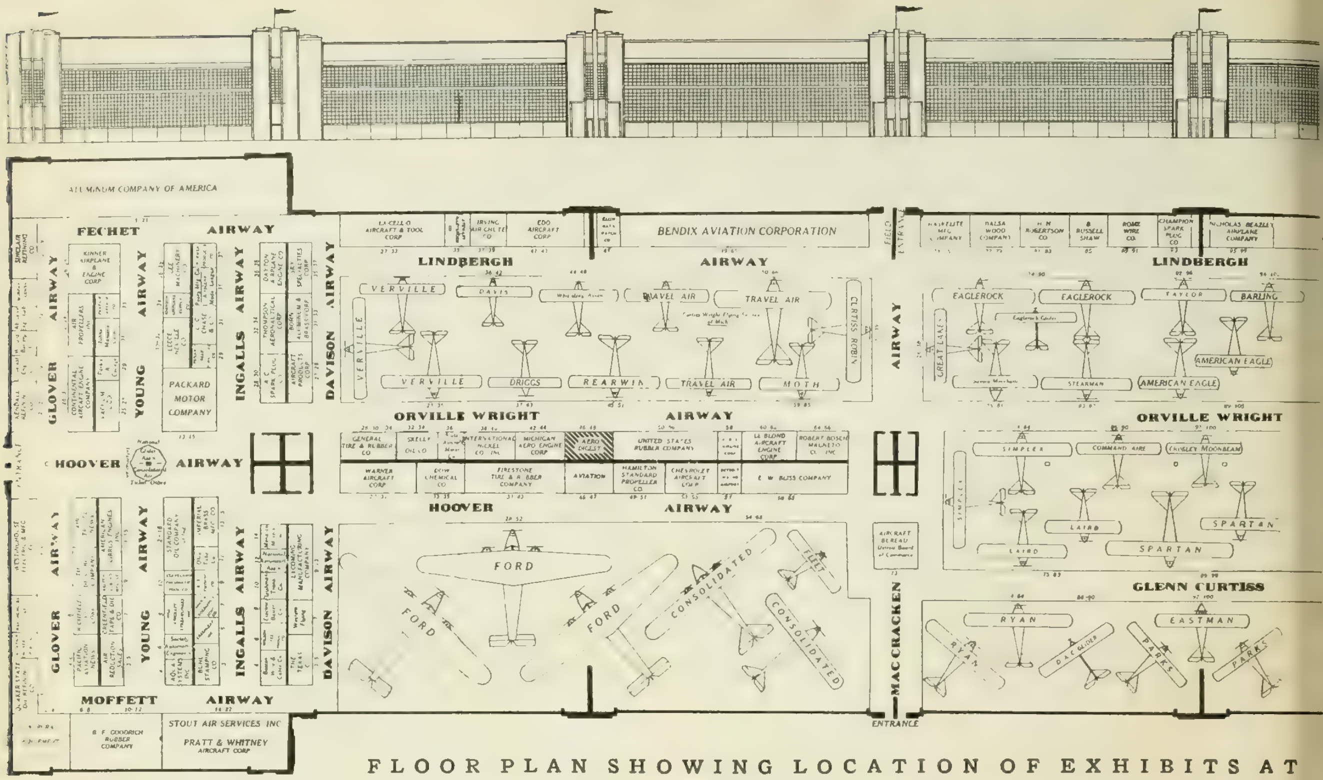
The show is to be opened with the dedicatory ceremonies for the new building which include a flight over the municipal airport by a detachment of planes of the First Pursuit Group of the Army Air Corps, Selfridge Field. The daily program during the remaining eight days of the show is as follows: Famous Pilots' Day, Ladies' Day, International Day, Engineers' and Glider Day, Diplomatic Day, Governor's Day, Family Day, and Closing Day, respectively. On April 10 at the Hotel Statler, an aviation banquet will be held in conjunction with the show, with the show management acting as host to the aeronautical industry. The aviation section of the Society of Automotive Engineers will be in session April 8-10 during the All-American show, and will sponsor the glider demonstration scheduled to be held at the airport on the afternoon of April 9.

The Society of Automotive Engineers will hold its session at the Book-Cadillac Hotel, Detroit. Papers to be presented in the program which has been arranged include the following: Improvements in Diesel Aircraft Engine Development, by Capt. L. M. Woolson of the Packard Motor Company; and Criticism of Present Engines from a Transport Operator's Viewpoint, by E. P. Lott and Wesley M. Smith of National Air Transport, Inc. The Society will also discuss the value of lightness to an airplane, the construction and per-

(*Continued on page 262*)



Location of the exhibition building (A) in relation to the Detroit City Airport



FLOOR PLAN SHOWING LOCATION OF EXHIBITS AT

ALPHABETICAL LIST OF AIR SHOW EXHIBITORS

And Their Locations in the Exhibition Building

AIRPLANES

Aeronautical Corp. of Amer., 132-136 "Lindbergh Airway."

Alexander Aircraft Company, 74-90 "Lindbergh Airway."

Alliance Aircraft Corp., 11-17 "Patrick Airway."

Amer. Eagle Aircraft Corp., 89-105 "Wright Airway."

Amer. Aeronautical Sales 75-81 "Wright Airway"

Bellanca Aircraft Corp., 101-113 "Curtiss Airway."

Buhl Aircraft Company, 123-135 "Curtiss Airway."

Consolidated Aircraft Corp., 54-68 "Hoover Airway."

Crosley Aircraft Corp., 92-100 "Wright Airway."

Curtiss-Robertson Airplane, 25-39 "MacCracken Airway."

Davis Aircraft Corp., 36-42 "Lindbergh Airway."

Driggs Aircraft Corp., 37-43 "Wright Airway."

Eastman Aircraft Corp., 92-100 "Curtiss Airway."

Fairchild Airplane Mfg. Corp., 106-116 "Lindbergh Airway."

Fokker Aircraft Corp., 144-162 "W. Aviation Con."

Great Lakes Aircraft Corp., 26-38 "MacCracken Airway."

Issoudun Aircraft Corp., 143-151 "E. Aviation Con."

Kari-Keen Aircraft, Inc., 126-132 "Wright Airway."

Keystone Aircraft Corp., 163-171 "W. Aviation Con."

E. M. Laird Airplane Co., 75-85 "Curtiss Airway."

Lockheed Aircraft Corp., 100-116 "Curtiss Airway."

Metal Aircraft Corp., 170-172 "E. Aviation Con."

Mohawk Aircraft Corp., 86-90 "Wright Airway."

Mono Aircraft Corp., 127-135 "Wright Airway."

Moth Aircraft Corp., 59-65 "Wright Airway."

Nicholas-Beazley Co., 98-102 "Lindbergh Airway."

Ogden Aeronautical Corp., 144-152 "E. Aviation Con."

Parks Aircraft Corp., 92-100 "Curtiss Airway."

Pitcairn Aircraft, Inc., 154-162 "E. Aviation Con."

Rearwin Airplanes, Inc., 45-51 "Wright Airway."

Ryan Aircraft Corp., 74-84 "Curtiss Airway."

Sikorsky Aviation Corp., 164-168 "E. Aviation Con."

Simplex Aircraft Corp., 74-84 "Wright Airway."

Spartan Aircraft Co., 89-99 "Curtiss Airway."

Stearman Aircraft Co., 83-87 "Wright Airway."

Stinson Aircraft Corp., 122-142 "Curtiss Airway."

Stout Metal Airplane Co., 28-52 "Hoover Airway."

Taylor Bros. Aircraft Corp., 92-96 "Lindbergh Airway."

Travel Air Company, 50-66 "Lindbergh Airway."

Verville Aircraft Co., 27-35 "Wright Airway."

Waco Aircraft Corp., 121-125 "Wright Airway."

Whittelsey Mfg. Co., 44-48 "Lindbergh Airway."

GLIDERS

Alexander Aircraft Corp., 74-90 "Lindbergh Airway."

Bowlus Sail Plane Co., (Space to be assigned.)

Detroit Aircraft Corp., 74-84 "Curtiss Airway."

ACCESSORIES AND OTHER PRODUCTS

A-B-C Airline Corp., 58 "Orville Wright Airway."

Abrasive Engineering Lab., 33 "Glover Airway."

A C Spark Plug Co., 28-30 "Ingalls Airway."

Aero Digest, 46-48 "Wright Airway."

Aero Supply Mfg. Co., 137 "Lindbergh Airway."

Aircraft Products Corp., 27-29 "Davison Airway."

Airplane Model League, 35 "Ingalls Airway."

Air Propellers, Inc., 32-34 "Glover Airway."

Air Reduction Sales Co., 3-5 "Young Airway."

Air Transportation, 40 "Patrick Airway."

Airway Age, 101-103 "Lindbergh Airway."

Allied Products Corp., 6 "Moffett Airway."

Aluminum Co. of America, 1-21 "Fechet Airway."

American Cirrus Engines, 11-15 "Young Airway."

Aqua Systems, Inc., 4 "Young Airway."

Aurora Equipment Corp., 2-4 "Moffett Airway."

Aviation, 45-47 "Hoover Airway."

The Balsa Wood Co., 77-79 "Lindbergh Airway."

Bendix Aviation Corp., 51-65 "Lindbergh Airway."

Berry Bros., Inc., 121-129 "Lindbergh Airway."

Bethlehem Steel Co., 14 "Ingalls Airway."

E. W. Bliss Co., 59-65 "Hoover Airway."

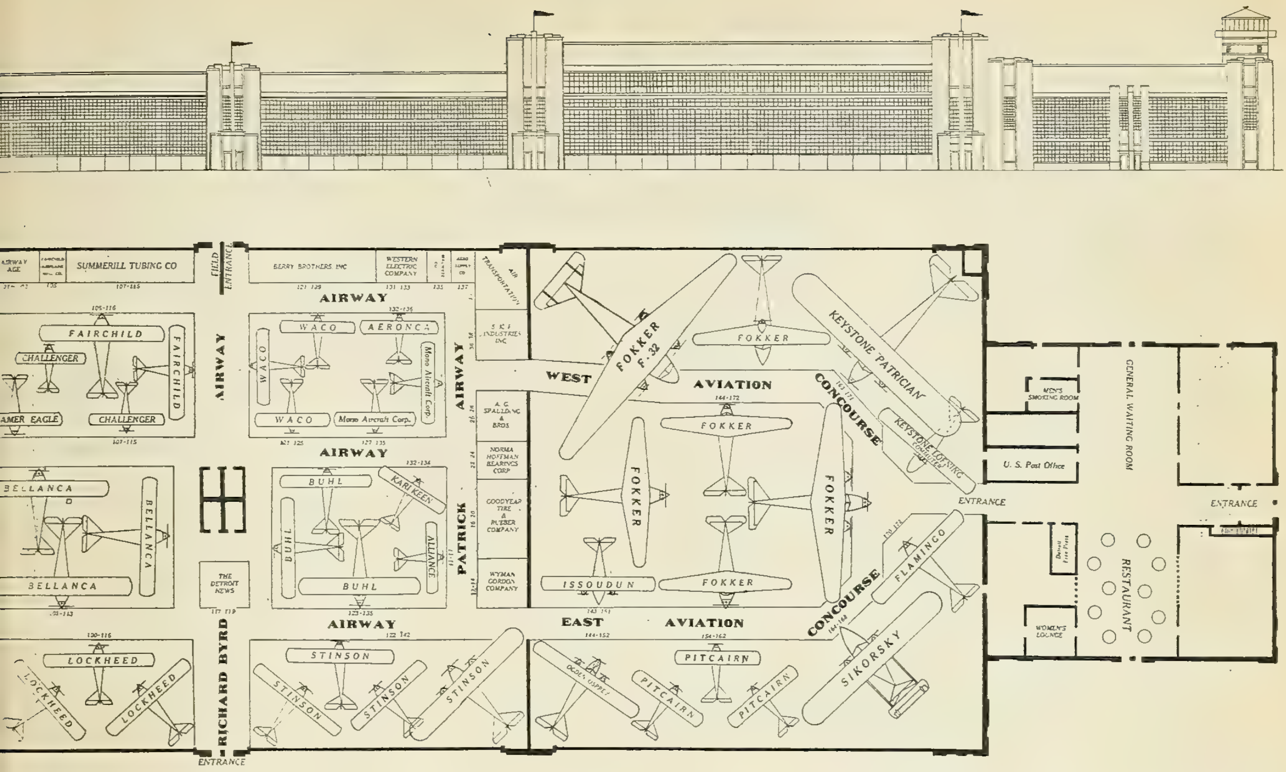
Bohn Alum. & Brass Corp., 31-33 "Davison Airway."

Robert Bosch Magneto Co., 64-66 "Wright Airway."

Boston Wire & Cable Co., 4 "Ingalls Airway."

Buhl Stamping Co., 3 "Ingalls Airway."

Champion Spark Plug Co., 93 "Lindbergh Airway"



HE ALL AMERICAN AIRCRAFT SHOW, DETROIT, MICHIGAN.

L. C. Chase & Co., 31 “Ingalls Airway.”

Cleveland Pneumatic Tool Co., 10 “Young Airway.”

Chevrolet Aircraft Corp., 53-55 “Hoover Airway.”

Consolidated Ticket Office, “Hoover Airway.”

Continental Aircraft Engine, 26-30 “Glover Airway.”

Curtiss-Wright Flying Serv., 50-66 “Lindbergh Airway.”

Dayton Airplane Engine Co., 36-38 “Ingalls Airway.”

Detroit Board of Commerce, 73 “Glenn Curtiss Airway.”

Detroit Free Press, Administration Building

Detroit News, 117-119 “Curtiss Airway.”

Detroit-Wayne Airport, 57 “Hoover Airway.”

The DeVilbiss Company, 12 “Glover Airway.”

Dow Chemical Company, 33-35 “Hoover Airway.”

Edo Aircraft Corporation, 41-43 “Lindbergh Airway.”

Electric Storage Battery Co., 8 “Ingalls Airway.”

Elgin National Watch Co., 47 “Lindbergh Airway.”

Ex-Cell-O Aircraft & Tool, 27-33 “Lindbergh Airway.”

Fairchild Airplane Mfg. Co., 105 “Lindbergh Airway.”

Firestone Tire & Rubber Co., 37-43 “Hoover Airway.”

Fleishman Transportation Co., 10 “Ingalls Airway.”

General Tire & Rubber Co., 28-30 “Wright Airway.”

B. F. Goodrich Rubber Co., 8-12 “Moffett Airway.”

Goodyear Tire & Rubber Co., 16-20 “Patrick Airway.”

Greenfield Tap & Die Corp., 7 “Young Airway.”

Greenleaf, Incorporated, 5 “Ingalls Airway.”

Hamilton Standard Propeller, 49-51 “Hoover Airway.”

Harwen Products Corp., 37 “Ingalls Airway.”

Haskelite Mfg. Corporation, 73-75 “Lindbergh Airway.”

Hill Aircraft Streamliners, 8 “Young Airway.”

Imperial Brass Mfg. Co., 13-15 “Ingalls Airway.”

International Nickel Co., Inc., 38-40 “Wright Airway.”

Johns-Manville Corporation, 31 “Young Airway.”

Irving Air Chute Co., Inc., 37-39 “Lindbergh Airway.”

Johnson Airplane & Supply, 34 “Young Airway.”

Kelton Aurand Mfg. Co., 9 “Young Airway.”

Kendall Refining Company, 25-27 “Glover Airway.”

Kinner Airplane & Motor Co., 36-38 “Glover Airway.”

LeBlond Aircraft Engine, 60-62 “Wright Airway.”

Lee Machinery Company, 36-38 “Young Airway.”

The Leece Neville Company, 30-32 “Young Airway.”

Lycoming Mfg. Company, 9-13 “Davison Airway.”

Macwhyte Company, 135 “Lindbergh Airway.”

Michigan Aero Engine Corp., 42-44 “Wright Airway.”

Murphy Varnish Company, 35 “Glover Airway.”

National Air Pilots’ Assn., Administration Building.

National Aeronautic Assn., 12 “Ingalls Airway.”

National Glider Association, “Hoover Airway,”

Nicholas-Beazley Co., Inc., 95-99 “Lindbergh Airway.”

Norma-Hoffman Bearings, 22-24 “Patrick Airway.”

Ohio Seamless Tube Co., 11 “Ingalls Airway.”

Packard Motor Company, 13-15 “Hoover Airway.”

Parks Air College, 29 “Young Airway.”

Posey Mfg. Company, 35 “Ingalls Airway.”

Pratt & Whitney Aircraft, 14-22 “Moffett Airway.”

The Prospect Fire Engine Co., Apron of Show Building.

Quaker State Oil Company, 1-3 “Glover Airway.”

Richfield Oil Corporation, 8 “Glover Airway.”

Rome Wire Company, 89-91 “Lindbergh Airway.”

H. H. Robertson Company, 81-83 “Lindbergh Airway.”

John A. Roebling’s Sons Co., 7 “Ingalls Airway.”

B. Russell Shaw Co., Inc., 85 “Lindbergh Airway.”

Shell Oil Company, 49 “Lindbergh Airway.”

Sinclair Refining Company, 37-39 “Glover Airway.”

Skelly Oil Company, 32-34 “Orville Wright Airway.”

S K F Industries, Inc., 36-38 “Patrick Airway.”

Sky Specialties Corporation, 35-37 “Davison Airway.”

Snap-On Wrench Company, 33 “Young Airway.”

Soc. of Automotive Engineers 6 “Young Airway.”

A. G. Spaulding & Bros., 26-28 “Patrick Airway.”

Standard Oil Co. of Indiana, 12-16 “Young Airway.”

Stewart Hartshorn Company, 35 “Lindbergh Airway.”

Stout Air Services, Inc., 14-22 “Moffett Airway.”

Harry Stutz Aircraft Motor, 36 “Wright Airway.”

Summerill Tubing Company, 106-115 “Lindbergh Airway.”

The Texas Company, 3-5 “Davison Airway.”

Thompson Aeronaut. Corp., 32-34 “Ingalls Airway.”

E. S. Twining & Company, 9 “Ingalls Airway.”

Universal Engineering Co., 29 “Glover Airway.”

United States Post Office, Administration Bldg.

United States Rubber Co., 50-56 “Wright Airway.”

Vacuum Oil Company, 25-27 “Young Airway.”

Warner Aircraft Corp., 27-31 “Hoover Airway.”

Western Electric Company, 131-133 “Lindbergh Airway.”

Western Flying, 7 “Davison Airway.”

Westinghouse Electric Co., 9-15 “Glover Airway.”

Westinghouse Lamp Co., 7 “Glover Airway.”

Willard Storage Battery Co., 31 “Glover Airway.”

Wilson Steel Products Co., 6 “Ingalls Airway.”

Wyman-Gordon Company, 12-14 “Patrick Airway.”

Ypsilanti Reed Furniture Co., 29 “Ingalls Airway.”

CRASH OF THE MONTH CLUB

By

Cy Caldwell

IT's about time something was said about the great work being done, or half done, or even dodged, by that group of keen minds gathered together in a local talk-softly to solve the various problems of the aviation industry. This group, well and favorably known as the National Council of Misspent Aeronautics, has been hard at work trying to find solutions to such tough nuts as these:

1. How to get Admiral Byrd to return and remain indefinitely at the South Pole so Russell Owen can continue writing more and more about less and less.
2. How to revive interest in refueling flights and dance marathons, both equally important aeronautically.
3. How a man can design an airplane to carry a hundred passengers before he has yet designed one to carry two dozen passengers successfully.
4. How to get Charlie Levine's ocean airline from the newspapers to the ocean.

Those are only a few of the problems that await solutions, or disillusions—either being welcome. My own part of this Misspent Aviation program centers on the problem of what to do with airplanes that somebody has built but nobody has bought. Mr. Ford solved his own, by erecting that museum at Dearborn. But everybody can't build a museum. Most of them have used up their money building the airplanes and have nothing left over with which to put up a storage warehouse. Doctor Bill Arthur says the thing to do is to erect more hangars, but as Bill is the country's champion hangar erector, there may be a personal angle to that advice.

What we've got to do every time the market gets flooded with aircraft is to find new markets, or create a new demand in the old market. And I'm glad to announce that, after considerable research, I have discovered a way to create that demand.

I made a detailed study of the airplane market as we know it, hunting desperately for someone who wanted to buy an airplane. My first thought, of course, was the ocean flight market. Now, there's a market that is most satisfactory, because as a rule the plane only makes one flight, after which the survivor—if he *is* a survivor—is back for a replacement. Renee Fonck started the custom, Haldeman and Elder added grace to it, and "Shorty" Cramer and "Fish" Hassell turned it into a tradition. I found, however, that this market was completely shot, through the later flights rating only a single column on the front page. It will take a 'round-the-world non-stop refueling flight to make a two-column heading on the front page, with a picture of the crew running as far back as the twelfth page. So who's going to boost aviation by spending thousands of dollars only to land up next to the real estate ads and the linseed oil quotations? Nobody, except perhaps Harry Husted.

Then I went into the school situation and made a study of that. I found that their problem was not how to get more planes, but how to pack the ones they had in the hangar so the wings wouldn't collide, and so they could close the doors without leaving the tails out. Rubber airplanes seem to be the only solution to that one.

Well, I thought and thought, and got nowhere, which is my customary destination. And to complicate matters I entered the manufacturing field myself with the "Auto-Cyro," a plane of my own design—with features swiped from every other plane, as is also customary. That, as you have heard, is a fool-proof airplane, though to date I haven't found anyone to buy it, which is the final test. A fool-proof plane for clumsy customers was, I had been told, what the people were crying for, though by the time I put mine on the market the folks apparently had got through crying and had wiped their eyes.

However, being a manufacturer myself was what really led me to a solution of the problem of what to do with something on hand that you didn't know what to do with off-hand. Because I got with other manufacturers at their meetings, where we'd all sit around and mutter, "What will I do with that last six?" "Where can I store those remaining twelve?" "Where can I find someone who wants even *one?*" And so on. You see, it was just the automobile business all over again. Whenever any business gets good for those who are already in when it got good, a whole flock more grab their money or somebody else's money, and get in too. Then it gets worse for everybody.

More planes were produced than people would buy, so the factories had to stop producing. The fly in the ointment was that no matter how fast aviation used equipment, the manufacturers were several steps ahead of consumption with their production. And in addition to the new boys in the game, the old boys, who had been selling a hundred planes a year at a profit, went to work and expanded their facilities to turn out a thousand planes at no profit at all—because if they couldn't sell them they certainly couldn't profit on them. Why they didn't see that during 1929 is another problem being worked on by our National Council of Misspent Aeronautics.

However, as I say, being a manufacturer myself sort of stimulated my imagination. Besides, with that unsold "Auto-Cyro" on my hands, I found myself with practically no liquid assets, as Dick Hoyt would say in his facetious financial way. The liquid assets were finished, and even the solids, such as ham and eggs, were unprocurable. The resultant hunger stimulated my imagination to such an extent that my mind, undecided whether to stay with a rapidly disintegrating body or to flit on to the spirit world, leaped at a solution of the difficulty.

If all the markets were flooded with airplanes, it became evident to me in a flash—a sort of inspiration, or perspiration, you might say—that the thing to do would be to remove the planes that were clogging the further progress of manufacturing. In order to sell a new airplane, first wipe the old airplane off the map.

Well, folks, that process has been going on for years and years, until today there is scarcely a mountain, forest, field or lake in this country that some airplane has not been permanently parked upon. But the process has been too casual to benefit the manufacturers as it would if the efforts of pilots could be directed and encouraged. Because, as things stand now, the manufacturers have been turning out airplanes faster than the pilots could wreck them.

So I now appeal to the pilots to catch up to us. While we produce, you reduce. With a little less care, a little more flying in bad weather, a few more stunts, you can do a great deal to clear the old goods off the shelves and make way for the new.

And at the same time you will be advertising aviation to the public. A crash not only

(*Continued on page 236*)

AMERICA'S FIRST AIR JOURNEY

By James Hay, Jr.

WHENEVER Mr. Hoover receives a celebrated flier at the White House with the acclaim and publicity which delight the soul of even a hero, he follows a precedent set by the first President of the United States. George Washington began the thing in 1793, and he did it with all the pomp and impressiveness appropriate to such an occasion.

In Philadelphia, then the seat of the Federal Government, excitement had prevailed when it was announced that a Frenchman, Monsieur Jean Pierre Blanchard, three days hence would ascend in a balloon from the old prison court of the town and make a long journey through the upper regions. Furthermore, it was authoritatively reported that Blanchard, having called on Mr. Washington the day after disembarking from the boat from Havre, had been promised that the Chief Magistrate would be at the prison court to witness this, the first successful journey through American air.

Thereupon, the city became a bedlam of debate and discussion. On the streets, in drawing rooms and taverns and on the floor of Congress, men expressed their diverse opinions.

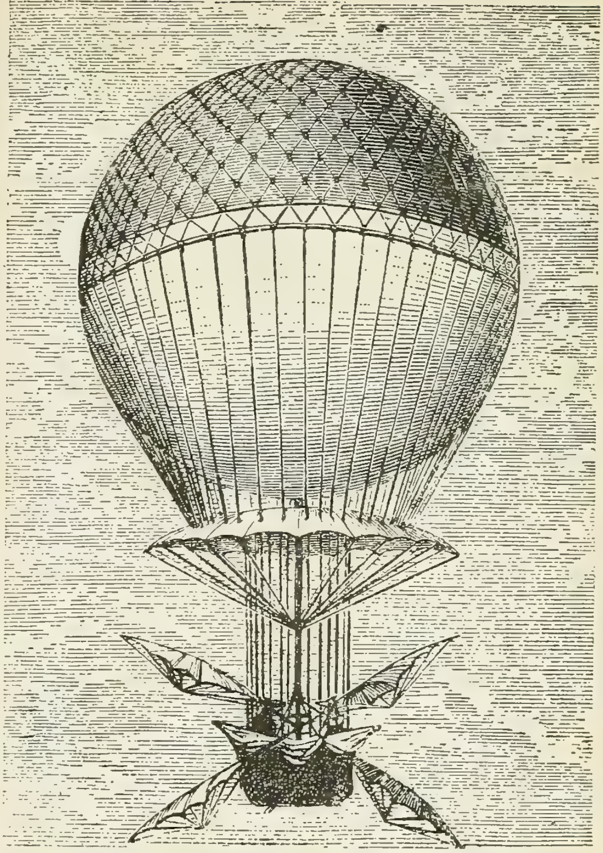
Many of the conservative gentlemen disparaged the affair. Who ever heard of anybody's navigating the air? It was true that reports had come from Europe that Jean Francois Pilatre de Rozier and this same Blanchard had gone up in balloons, some inflated with gas, some with heat from fire carried in their "cars" or "boats"; but European gossip was always full of exaggerations! Besides, de Rozier had been dashed to death. This fellow probably would follow suit and break his rash and reckless neck.

Others, more imaginative and optimistic, claimed that the event would be staged as advertised. Two Philadelphians a few years before had constructed a contraption consisting of forty-seven small hydrogen gas balloons to which a basket was attached. So sublime was their trust in their invention that, though they craftily remained on the ground, they were moved to heights of eloquence sufficient to induce a carpenter named James Wilcox to insert himself into the basket and be lifted skyward. But Mr. Wilcox's courage shrank in proportion to the altitude he reached. Seeing the river almost beneath him, he drew forth his chisel, axe of snickersnee and forthwith stabbed, hacked and carved so many of the forty-seven balloons that he returned to earth faster than he had risen from it.

Nevertheless, said the Blanchard supporters, this proved that a human being could defy the law of gravity. They awaited with confidence the flight of the daring Frenchman at ten o'clock in the morning of that January day.

Cannon were fired to announce the auspicious and fateful dawn. At short and regular intervals, the big guns thundered until ten o'clock. In the meantime a mighty cavalcade of carriages and horsemen pounded into the town. Mail carriers and couriers had informed the countryside far and near that the Frenchman, like Ajax defying the lightning, would undertake to ride the winds and hold converse with the stars.

At nine o'clock Blanchard appeared in the great prison court, finding it already packed with people. Going to the roped off space where the balloon had been placed the day before, he began the process of inflating the "big bag," twenty-seven feet in diameter. As the bag swelled with the hydrogen gas, a band played American and French airs, while the cannon kept up their salutes to heroism.



Early print of Blanchard's balloon in flight.

At a few minutes before ten, George Washington, accompanied by members of his Cabinet and their ladies, entered the court and took the seats reserved for them on the north side. No standing room was left. The mob pressed against the ropes. From every neighboring window heads were extended. Men and boys stood on roofs and climbed steeples. The streets were jammed.

Mr. Blanchard, making his way through the throng, approached the President, who stood up to shake hands with him. The Frenchman was highly excited, but not from fear.

He was the man who had made an air trip across the English Channel. He and an American, Dr. J. Jeffries, had started from Dover. When three-fourths of the way across, their balloon sank so alarmingly that they had to throw overboard everything in their car, the anchor and ropes and, worse than that, all except the most necessary parts of their clothing. But they got across.

Consequently, the aeronaut was accustomed to the dangers of his calling. Mr. Washington wished him a pleasant and fortunate journey. Then, as he was about to turn toward the balloon, the President handed him a folded and mysterious looking document. Blanchard, who talked as much with his hands and shoulders as he did with his tongue, did not know a word of English, but his speech of thanks in French, illustrated with abundant gesticulation, made plain his appreciation.

He climbed into his car. He bowed to the assemblage. He spoke a few words of

(*Continued on page 242*)

JOUKOWSKI'S VORTEX THEORY of PROPELLERS

An article based on a partial compilation and translation of two technical papers: "La théorie tourbillonnaire du Professeur N. Joukowski et le calcul des hélices propulsives aériennes," by V. L. Alexandroff, in "IV Congresso Internazionale di Navigazione Aerea"; and "Nomographic Calculation of Propellers based on Professor Joukowski's Vortex Theory of Propellers," by G. I. Kousmin, in the "Technic of the Air Fleet"; the former paper in French and the latter in Russian.

By

Dr. Michael Watter

PROPELLER theory has been given considerable attention not only because of the importance which propulsion plays in airplanes but also because of the possible adaptation of propellers to the development of helicopters. Recently the mindmill principle (which is but a phase in propeller operation) has been successfully adopted in the autogiro which furnishes one more method of flying. A number of propeller design methods have been advanced, and as far back as 1912 Professor Joukowski of the Imperial Technical Institute of Moscow created and published the vortex theory of propellers. This theory has been further amplified and developed by his pupils. Professor Vetchinkin evolved a method for calculating the most advantageous distribution of circulation along the propeller blades. Still later, Kousmin developed a nomographic chart for the design and analyses of propellers, greatly simplifying the work involved in calculations.

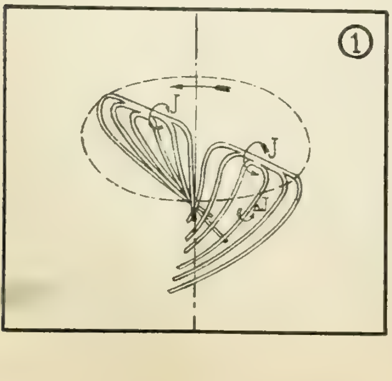
This article, as stated above, represents a partial compilation and translation of Alexandroff's and Kousmin's papers and is intended to give the reader a general outline of the theory with methods of its proctical application. It is not intended to be a critical review of the above papers which are based largely on papers of Joukowski, Vetchinkin and Jurieff, and the reader will find it advantageous to follow the latest developments of the theory. The data and diagrams given were not changed into our system of units but are retained in metric measurements.

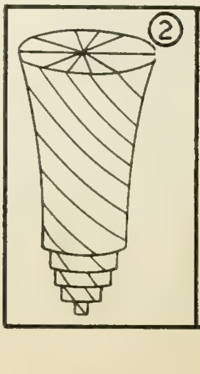
Joukowski's theory is based on the assumption that the velocity distribution due to a propeller can be considered as a function of series of vortices of which some are distributed along the propeller blades and called the adherent vortices and others, emanating from the latter ones and moving behind the disc of the propeller, called the free vortices.

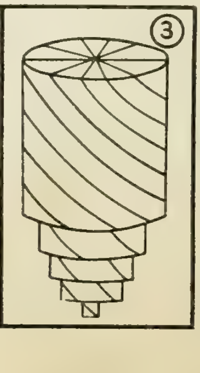
The adherent vortices are a means of explaining the circulation around the wings, while the free vortices are explained by the fact that the circulation must remain constant. Therefore, any change in circulation around the blades results in a free vortex of such an intensity that the total circulation is unchanged. In the case of a two-bladed propeller there are two adherent vortices corresponding to the propeller blades, series of vortices spilling along the blades (due to the change in circulation) and tip vortices. In analyzing the functioning of a propeller, we need not consider the blades but simply assume that the velocity distribution and circulation are due to the series of vortices as indicated by Figure 1.

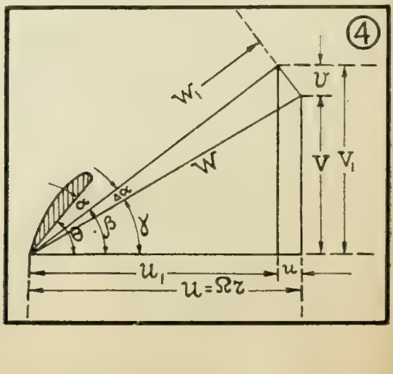
In analyzing the velocity field due to the above series of vortices, we may consider the relative motion of the propeller blades and attempt to evaluate the true velocities caused by the vortices, or, considering the vortices in their true or relative motion, to find the average velocities. The first problem is very complicated, and Joukowski used the second method which considers the average velocity due to a series of adherent and free vortices. Because of the motion of the propeller blades, the vortices occupy different positions in space and consequently the problem of velocity distribution may be considered as due to a number of vortex layers and a vortex disc, and since the time elapsed between the passage of two vortex lines is very small, one can consider the motion as a stable one. Since we know that the inflow increment is only one half in front of the disc and that it attains its full value behind the disc, it follows as a consequence that the airstream behind the disc must be somewhat reduced. Consequently, the vortex layers will have a form of surfaces of revolution which become cylindrical at a certain distance from the propeller disc. Inasmuch as the reduction of the propeller airstream is not large and the airstream becomes cylindrical not very far from the propeller disc, we may assume that the whole surface is cylindrical, which considerably simplifies the mathematical treatment of the problem. (Figures 2 and 3)

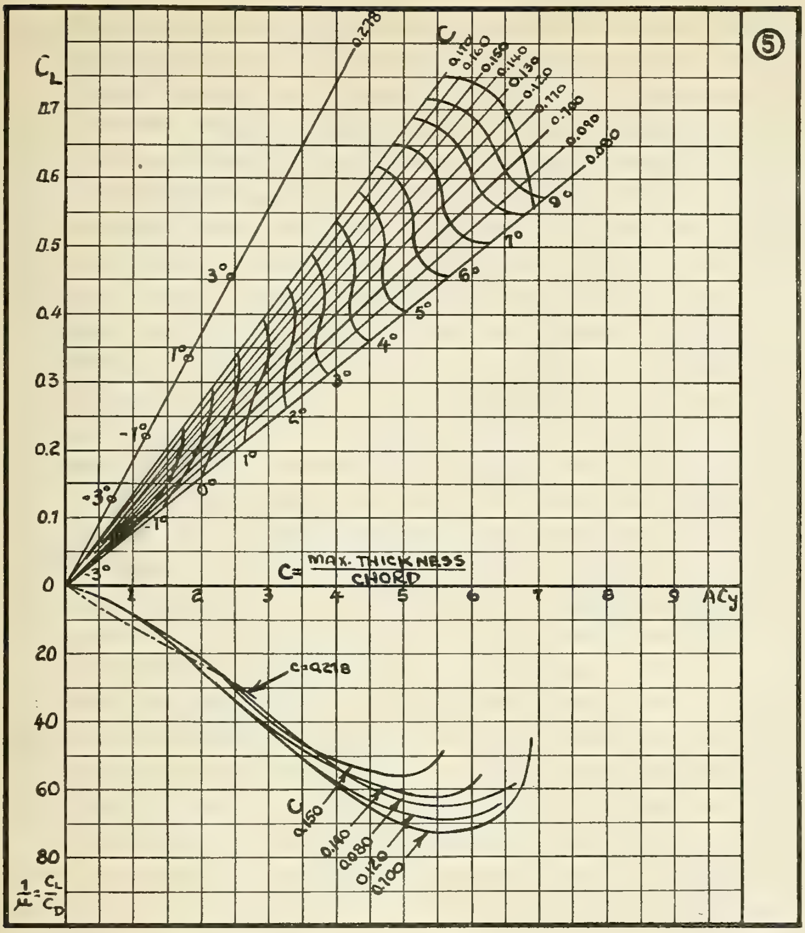
Assuming a certain distribution of circulation around the propeller blades, we fix the distribution and intensity of the vortex layers which in turn results in definite velocity distribution. In the case of constant circulation along the propeller blades, we have only a set of tip vortices and

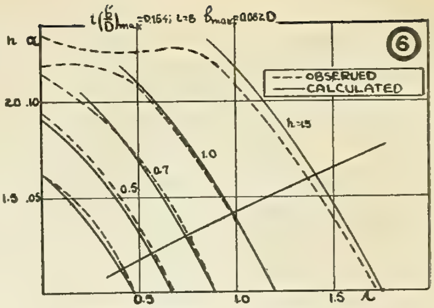












Thrust coefficients, R and M829

consequently a single cylindrical vortex layer with a diameter equal to that of the propeller. The average axial velocity will be constant and determined along the length of the propeller blade.

In order to simplify the formulae of the vortex theory we make use of non-dimensional coefficients. Consider a propeller rotating with an angular velocity Ω and advancing forward with a velocity V. Since the ordinary propeller blades are compartively narrow, each blade can be substituted by a small adherent vortex. Should the circulation change passing from a radius r to a radius r + dr by an amount dJ, then there will be a free vortex of an equal intensity, dJ' corresponding to the element dr. Making use of the theory of mechanical relativity, we can consider the propeller as stationary and then the velocity of the medium W can be resolved into V-axial and $U=\Omega r$-rotational components. The latter, it is understood, is referred to a considerable distance forward of the propeller disc, since the propeller causes an increment in airspeed. Denoting this increment as w, we may resolve it into an axial component v and a rotational $u=\omega r$, neglecting the radial increment which is very small. The true relative air speed becomes W_1 with an axial component $V_1 = V + v$ and a rotational $U_1 = (U-\omega)$ r. This true relative air speed W_1 makes an angle $\Delta\alpha$ with the relative speed W.

Choosing as parameters of a propeller:
i = number of blades
R = radius of the propeller
ϱ = air density
$\Omega = 2\pi n$ — angular velocity
V = speed of advance

it is possible to simplify the mathematical solution by introducing non-dimensional coefficients and solving the problem for a model two-bladed propeller which has the same relative ratio of blade areas to total disc area, with a radius equal to unity. This propeller is assumed to be working in a fluid with a density equal to unity, and its angular velocity is also taken as unity. The speed of advance is chosen in such a way that the ratio of V/Ω is unchanged. Then the first four parameters become unity and there remains only one variable parameter, $\bar V = V/\Omega R$.

The circulation and the blade width are referred to the circumference 2πR and not to the radius.

The non-dimensional coefficients can be written then as follows:

Radius .... $\bar r = r/R$
Speed of advance.. $\bar V = V/R$
Circulation .... $\bar J = iJ/4\pi R^2$
Blade width........................... $\bar b = ib/4\pi R$
Propeller thrust...................... $\bar T = T/2\pi\varrho\Omega^2R^4$
Power absorbed........................ $\bar P = P/2\pi\varrho\Omega^3R^5$
Rotational speed...................... $\bar U = U/\Omega R$
Relative speed........................ $\bar W = W/\Omega R$
(See figure 4)

In accordance with the theory the rotational component can be expressed as

$$\bar U = \bar J/\bar r \quad \ldots\ldots\ldots\ldots (1)$$

and the axial must be found from the following equation

$$\bar v(\bar V+\bar v) = \bar J(1-1/\bar r^2)+\int_{\bar r}^{1}\frac{1}{\bar r^3}\bar J^2 d\bar r \quad \ldots\ldots\ldots (2)$$

where the last member is due to centrifugal forces. It can be shown that equation 2 can be taken with approximation sufficient for all practical purposes

$$\bar v(\bar V+\bar v) = \bar J(1-\bar J) \quad \ldots\ldots\ldots\ldots (3)$$

According to the Theorem Kutta-Joukowski

$$\bar J = C_L\,\bar b\,\bar W_1 \quad \ldots\ldots\ldots\ldots (4)$$

The expressions for elementary thrust, power and efficiency can be written as follows:

$$\left.\begin{aligned}\frac{d\bar T}{d\bar r} &= 2\bar J(\bar U_1-\mu\bar V_1)\\ \frac{d\bar P}{d\bar r} &= 2\bar J(\bar V_1+\mu\bar U_1)\bar r\end{aligned}\right\}\ldots\ldots\ldots\ldots (5)$$

and efficiency

$$\bar{\eta}_r = \frac{d\bar{T}.V}{d\bar{P}} \cdot \frac{(\bar{U}_1 - \mu V_1)}{(\bar{V}_1 + \mu\bar{U}_1)} \cdot \frac{V}{\bar{r}}$$

where $\mu = \frac{C_p}{C_L}$, the coefficients C_p and C_L being referred to an infinite aspect ratio. The formulae 5 can be expressed using thrust coefficient α and power coefficient β.

$$\alpha' = \frac{d\,\alpha}{d\,\bar{r}} = \frac{d}{d\,\bar{r}}\left(\frac{T}{\varrho n^2 D^4}\right) = \frac{\pi^3}{2}\,\frac{d\,\bar{T}}{d\,\bar{r}}$$

$$\beta' = \frac{d\,\beta}{d\,\bar{r}} = \frac{d}{d\,\bar{r}}\left(\frac{P}{\varrho n^3 D^5}\right) = \frac{\pi^4}{2}\,\frac{d\,\bar{P}}{d\,\bar{r}}$$

$$\bar{\eta}_r = \frac{\alpha'}{\beta'}\,\frac{\lambda}{\bar{r}} \text{ where } \lambda = \frac{V}{n\,D} = \pi\,\bar{V}$$

$$\left.\begin{aligned} \alpha' &= \pi^3\,C_L\,\bar{b}\,\bar{W}_1^2 \cos\beta\,(1 - \mu\tan\beta) \\ \beta' &= \pi^3\,C_L\,\bar{b}\,\bar{W}_1^2 \sin\beta\,(1 + \mu\cot\beta) \end{aligned}\right\}\ldots\ldots\ldots\ldots\ldots\ldots(6)$$

but since $\bar{W}_1 = \bar{W}\cos\Delta\,\alpha = \bar{r}\,\frac{\cos\Delta\,\alpha}{\cos\gamma}$

we have

$$\left.\begin{aligned} \alpha' &= \pi^3\,C_L\,\bar{b}\,\bar{r}^2\,\frac{\cos^2\Delta\,\alpha}{\cos^2\gamma}\cos\beta\,(1 - \mu\tan\beta) \\ \beta' &= \pi^4\,C_L\,\bar{b}\,\bar{r}^2\,\frac{\cos^2\Delta\,\alpha}{\cos^2\gamma}\sin\beta\,(1 + \mu\cot\beta) \\ \bar{\eta}_r &= \frac{\alpha^1}{\beta^1}\,\lambda = \frac{1 - \mu\tan\beta}{1 + \mu\cot\beta}\,\frac{\tan\gamma}{\tan\beta} \end{aligned}\right\}\ldots\ldots\ldots\ldots(7)$$

In the case of a non-viscous fluid $\mu = 0$ and hence subscript i indicates ideal fluid.

$$\left.\begin{aligned} \alpha'_1 &= \pi^3\,C_L\,b\,\bar{r}^2\,\frac{\cos^2\Delta\,\alpha}{\cos^2\gamma}\cos\beta \\ \beta'_1 &= \pi^4\,C_L\,b\,r^3\,\frac{\cos^2\Delta\,\alpha}{\cos^2\gamma}\sin\beta = \pi\,r\,\alpha'_1\tan\beta \\ \bar{\eta}_{r1} &= \frac{\tan\gamma}{\tan\beta} \end{aligned}\right\}\ldots\ldots(8)$$

and therefore, equation 8 can be rewritten

$$\left.\begin{aligned} \alpha' &= \alpha'_1\,(1 - \mu\tan\beta \\ \beta' &= \beta'_1\,(1 + \mu\cot\beta) = \frac{\lambda}{\bar{\eta}_r}\,.\,\alpha' \\ \bar{\eta}_r &= \bar{\eta}_{r1} : \bar{\eta}_{r0} \quad \text{where} \quad \bar{\eta}_{r0} = \frac{1 - \mu\tan\beta}{1 + \mu\cot\beta} \end{aligned}\right\}\ldots\ldots\ldots(9)$$

Using formulae 9 and a nomographic diagram proposed by Kousmin (which will be explained further on) it is possible to determine primary and secondary conditions of a given propeller for different values of $\lambda = V/nD$ or to design a new propeller.

Inasmuch as the problem of strength puts certain limitation on possible aerodynamic improvements of any given propeller, Vetchinkin in 1918 proposed a method whereby a rational selection of blade profile can be made taking due account of aerodynamical properties and strength requirements.

The section modulus of a blade can be expresed in a general form as $W = (b/A)^3$ where b is the width of the blade and A a certain coefficient varying according to the profile and blade width. Since $M/f_a \leqq W$ where M is the bending moment imposed and f_a is the allowable fibre stress, substituting we have

$$A \geqq b^3\,\sqrt{f_a/M} \text{ or } AC_L \geqq bC_L^3\sqrt{f_a/M}$$

(*Continued on page* 234)

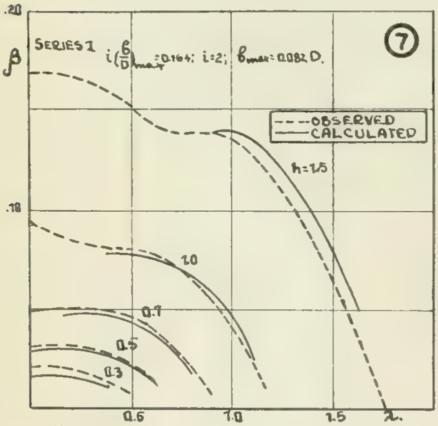


Fig. 7. Power coefficients, R and M 829

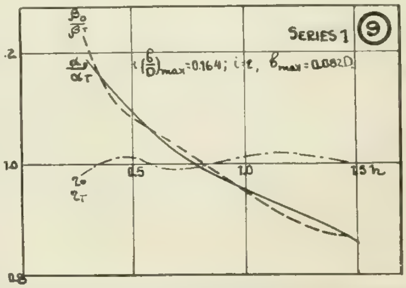


Fig. 9. Ratio of observed to calculated values of coefficients at maximum propeller efficiency

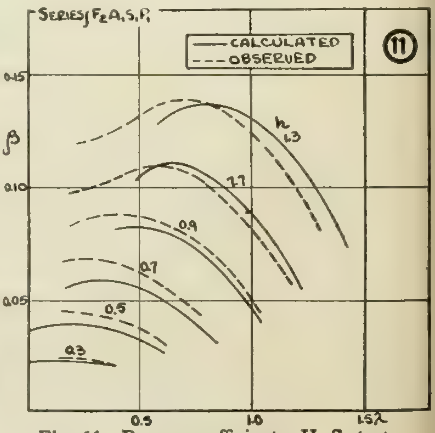


Fig. 11. Power coefficients, U. S. tests

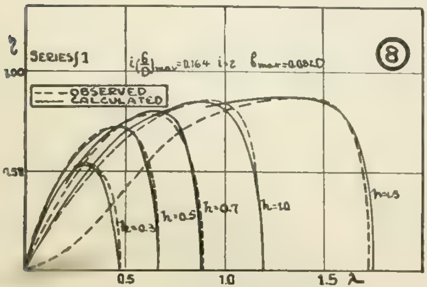


Fig. 8. Propeller efficiency, R and M 829

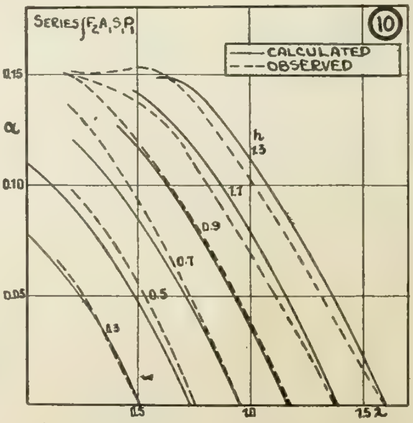


Fig. 10. Thrust coefficients, U. S. tests

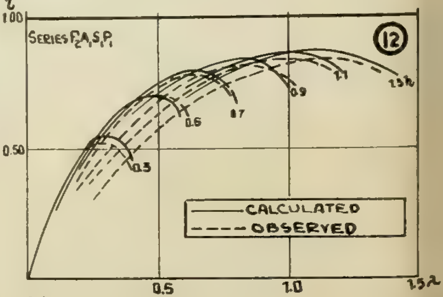


Fig. 12. Propeller efficiency, U. S. tests

SPEED and ALTITUDE
RECORDS MADE WITH A LOAD-CARRYING SEAPLANE

By Capt. Boris Sergievsky, *of the Sikorsky Aviation Corp.*

IGOR SIKORSKY has not held nor attempted to secure a world's record since 1913. Seventeen years ago his four-motored cabin biplane, the S-6, was one of the sensations of Europe. Not only was it the first and largest multi-motored airplane ever flown, but at that time it broke all records for distance, endurance and load carrying. They were not spectacular records perhaps—but they were important in that they represented an airplane which could carry the largest useful load to the greatest altitude and at the greatest speed.

When the war broke out Mr. Sikorsky was busy building military planes for the Imperial Russian army, and of course, no time could be given to the establishment of official records. One by one the records his 1913 ship made were exceeded by the planes of other nations.

CAPTAIN BORIS SERGIEVSKY

Born in Russia 1888. Joined the Russian Imperial Army 1911. Entered Aviation at the Polytechnical student's aero club in 1912. Graduated from Polytechnical College of Kiev 1913. Transferred to Imperial Air Force in 1916. As Pursuit Squadron leader, shot down eleven German planes.

Received ten military medals and decorations, including the highest decoration of Imperial Russia, the officer's cross of St. George. Capt. Sergievsky (a United States citizen) is the only American to have this decoration.

After the Russian Revolution, joined the British Royal Flying Corps for the remainder of the war. After the Armistice, became flying instructor in the R. F. C.

Came to the United States in 1923 and joined the Sikorsky Aviation Corporation as engineer and test pilot. Has flown about 7,000 hours.

Waldemar A. Bary, general manager of the Sikorsky Aviation Corporation, suggested making public demonstration with the S-38 amphibion to prove its capacities for speed and altitude flying as a transport seaplane. The list of records endorsed by the National Aeronautic Association showed that some of them were being broken by the S-38 as a matter of daily routine flying.

As the chief pilot of the Sikorsky Aviation Corporation, I was chosen to confirm Mr. Bary's findings. We took one of our stock S-38's, but instead of the usual 425-horsepower Wasps, installed two Pratt & Whitney Hornet B 575-horsepower radial air-cooled engines. As a matter of fact, we believe we could have done the job with the Wasps, but we naturally wanted to make the best record possible.

Pratt & Whitney-engined Sikorsky used by Capt. Sergievsky

On March 4 Major Luke Christopher, secretary of the contest committee of the National Aeronautic Association, came to the North Beach base of New York Air Terminals to witness our first attempt at a record. We started with the altitude record for seaplanes with a load of 2,000 kilograms (4,409.24 pounds), formerly held by Lieut. de Vaisseau Paris, of France, with a French military ship, the C.A.M.S., powered with an Hispano-Suiza 600-horsepower engine. This record, made May 15 last, was 4,827 meters (15,837 feet).

My ship was equipped and serviced at the Sikorsky factory at Bridgeport, Conn., after which I flew it to North Beach. The furniture, toilet and other similar equipment had been removed from the ship. The load—consisting of iron plates which were placed in a rack in the cabin—was weighed on officially sealed scales. This weight is the equivalent of thirty-five passengers, figuring the weight of one passenger at 150 pounds. Enough gasoline was carried for about two hours' flight.

With this load I took off in exactly eighteen seconds, despite the fact that the loaded ship lay deep in the water. The ship seemed to fly better with its ballast. In a few minutes I had climbed out of sight of the waiting crowd. I continued to ascend, finally reaching a point where the ship ceased climbing, near its absolute ceiling. My altimeter indicated about 19,500 feet above sea level, and I knew then that one of the records had been broken.

In a few minutes I glided down to the surface of the water once more. The official barograph which Mr. Christopher had installed in the plane was sent to the Bureau of Standards in Washington. Subsequent calibration showed my exact ceiling was 19,065 feet.

On the following day—March 5—I took the same ship and the same load and went out after the speed record for "loaded seaplanes over a 100-kilometer course." A course of fifty kilometers had been measured from the beach at Fairfield, Conn., to Execution Rock

(*Continued on page 260*)

PROBLEMS in FINANCING DEALERS

By T. T. Hildebrandt

Manager, Aeronautical Division,
Commercial Investment Trust, Inc.

AVIATION time payment financing is developing rapidly and has already interested many of our country's leading finance companies. That there is a field for finance company activities in the aviation industry is reasonably well established. But, how extensive is the field at the present time? In looking to its further development, it seems natural and logical to measure its import by the standards established in other fields of transportation.

It is obvious that, because it compares in a general way to the automobile business, its development and method of growth should parallel somewhat that of the automotive industry. There are, however, a number of new factors that require earnest consideration.

With increased sales resistance facing aviation the coming year, the utilization of a finance company's facilities should measurably stimulate the industry as it has the automobile industry in similar critical times. Aviation, however, has the decided advantage of the vast experience gained by the finance companies in the automobile field, and the creation of plans, terms and regulatory practices are subject to more rapid development.

At the present time there are approximately 167 manufacturers engaged in the building of aircraft of various types, and, in addition, a large number of concerns engaged in allied industries, notably, the manufacture of engines, various classes of landing field equipment and other associated products. The opportunity for financing, then, extends even beyond the ships themselves and might be classified and segregated into several important fields: (a) Retail on commercial and pleasure craft, (b) wholesale on stocks at distributor points, and (c) field and allied equipment.

The first of these, retail financing, should find in the automobile industry a reasonable parallel. Aircraft are sold through distributors and dealers in about the same manner as are motor cars and, presumably, will ultimately be sold to a comparable type of purchase, as greater safety in flying is accomplished. Theoretically, at least, it would appear necessary to determine the safety of retail "paper," notes and chattel mortgages by the same yardstick: prestige and ability of manufacturer and dealers; aerodynamic qualities, engineering qualities and insurability of the ship; the moral and financial worth of the seller; the moral and financial worth of the retail purchaser; the pilot's qualifications and past record.

It is only necessary, then, to analyze fully the fundamentals that change the value of these factors developed from automobile experience when applied to retail aircraft financing.

Because the industry is still in an embryo stage, these factors are not easily measured. The progress is so rapid and the improvements are so emphatic that an excellent and up-to-date ship may be virtually obsolete tomorrow. The development that creates this rapid obsolescence is largely towards a greater degree of safety in the ship itself, and for that reason, such progress is highly desirable.

This observation makes it apparent that the element of manufacturer prestige cannot be given a credence comparable to that it receives in the automobile industry. Hence, more strength must be required by the finance company in the two other major credit essentials; namely, the financial strength of seller and purchaser. The greatest strength should be required from the seller, particularly if the purchaser is an individual operator, pilots the ship, and is exposed to the hazards of flight.

To finance ships at retail, therefore, is not quite as easy an undertaking as might at first be assumed, and certainly, the reasonable and initial protection of the finance company's investment demands sensibly imposed restrictions, principally: substantial down payment, short terms, thorough investigation of credit responsibility, desirability and experience of pilots, and practical insurance protection.

The matter of insurance will for some time present a complex problem. An examination of inherent hazards quickly indicates the difficulties involved; in addition to the usual risks of fire and theft, there stands out prominently the definite exposure to accidental damage, conversion, confiscation, disappearance, breach of warranties on part of purchaser, public liability, employer's liability, property damage, windstorm and tornado, and passenger liability. With the mechanical factor of safety such a variable point and consequently with so much depending on the skill and experience of the pilot, it would seem logical to anticipate a substantial amount of accidental damage, involving in one accident several of the other hazards referred to; i.e., collision damage, public liability, property damage, and then the liability of the employer where the pilot is injured in the regular line of duty.

Although it is a fact that many insurance carriers are now vitally interested in aviation and have given much study to the formulation of highly protective forms of coverage, they are measurably in an analogous position to finance companies and find it necessary to experiment from a theoretical basis until practical facts and experience establish a definite and controllable medium of hazard determination, from which should accrue actuarially scientific rate projections.

Today rates are experimental, because of a lack of background. That there is justification for the present rate levels has been well established, for the loss experience so far has been, if anything, adverse. Insurance underwriters have been gathering a lot of available data during the past year and for the first time upon a scientific basis upon which to predicate coverage and rates, and fortunately for the industry, have made it possible through the sharing of responsibilities for finance companies to undertake commitments that would otherwise not be possible.

The enumerated hazards previously mentioned, and the measurable protection which has been made available, would seem to indicate that the finance company's consideration of the merit of the part it should play in retail financing is directed quickly to its legal position. Again the automobile industry is the place to seek guidance in procedure. Assuming the availability of protection through the insurance media for certain specific hazards, it is necessary to investigate the remaining elements of risk which are just as specific but to which insurance has little or no application, except possibly at an exorbitant premium rate that would tend to retard time sales.

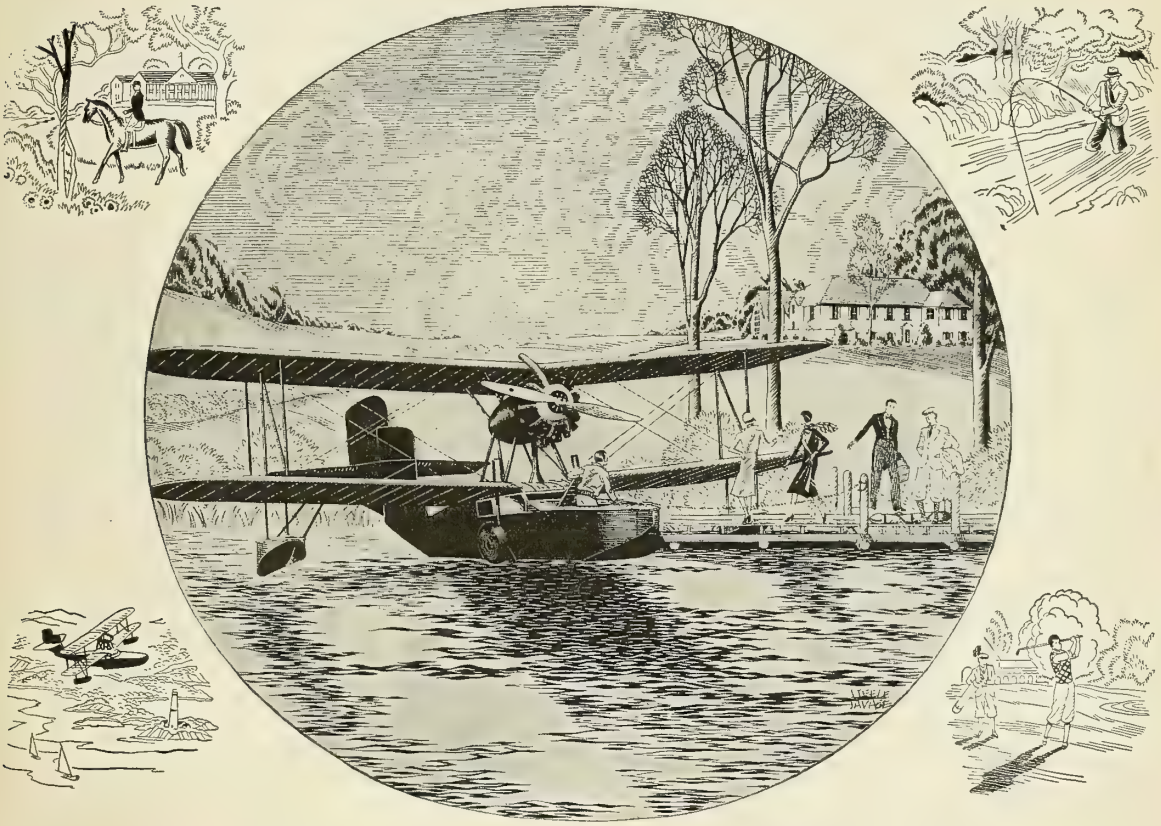
Essentially, the item of major importance is that of perfecting the contracts to be executed by installment purchasers, so that while complying with the various statutes, the finance company's position is properly secured and its legal title in the ship upon purchase of a lien instrument is satisfactory.

At this point of investigation

(*Continued on page* 224)

Sportsmen!

DO YOU HEAR THE CALL OF SPRING?



THE ground beneath the swamp maples is red with bursting buds. Over at the Country Club the greens are getting green. On northern lakes the ice is out, the trout are taking grubs. Spring is in the air! Spring is on the wing!

If you would flirt with Spring, fly a Commuter. Only in an amphibian can you pursue her successfully to all her loveliest haunts on land or water. And the Commuter is the only amphibian which you can convert from land plane to seaplane or vice versa in *five seconds*—and in full flight.

What freedom! What safety! You spy a lake that lures you. Touch the lever at your side and your land plane is ready to alight on water. Or you sight an island with a hard, smooth beach. Lower the wheels and your seaplane is ready to roll on the sands.

This Keystone-Loening Commuter is a sociable plane. It seats four, with duplicate control for the couple in front. Fore and aft there is plenty of room for golf sticks, fishing tackle and what not. And of course you dress as you please, for in the closed cabin there is no need for special flying clothes.

With a 300 H. P. Wright Whirlwind behind the propeller, you are into the air from either land or water in 12 seconds and climbing at 1000 feet a minute. Soar into the sunshine. Then head for the haunts of Spring at 90 miles an hour.

Sportsmen, do you hear the call of Spring? Now is the time to fly or to learn to fly. Let us demonstrate how wonderfully the Commuter maneuvers, how easy it is to operate, how perfectly it fits your needs for a personal plane at a cost of only $16,800. For booklet write Dept. C-70, Keystone Aircraft Corporation, Division of CURTISS-WRIGHT, 27 West 57th St., New York.

KEYSTONE-LOENING
AMPHIBIAN
COMMUTER

PERSONAIRLITIES

BY

Cy Caldwell

WHEN Lieut. James H. Doolittle said goodbye to the Army Air Corps and hello to Shell Petroleum Corp. of St. Louis, whose aviation activities he will direct, there was genuine regret among his comrades in the service that he should be departing for a sphere where Majors cease from troubling and even Generals are no more than passing scenery. Jimmy leaves the Air Corps with a brilliant record of accomplishment. His flight research work at McCook Field was outstanding and original, and resulted in much valuable data that had not before been available. It was during this test flying that he conceived and performed the outside loop, not as a stunt but to find the dynamic loads imposed upon an airplane during extreme conditions of flight.

Jimmy Doolittle was born at Alameda, Calif., December 14, 1896, lived in Alaska as a child, returned to California and completed three years at the University of California in the College of Mining. He even worked at mining engineering until November, 1917, when he was assigned to the School of Military Aeronautics at Berkeley, then to Rockwell Field, Coronado, for flight training. This completely ruined one perfectly good mining engineer. From then on it was a case of "don't go down the mine, daddy."

Jimmy was ordered to Dallas to teach others to fly, which did him out of a free ride to France—for which he has never quite forgiven the Great Minds of the Army. He spent the rest of the time until early 1919 hoisting the boys into the air, which is a very nerve-wrecking business and demands almost unlimited patience. Still, he had patience, and even his pupils liked him. In fact, everyone likes him. His modest, quiet, unassuming personality has endeared him to everyone in aviation. In fact, so highly is he regarded that Senator Sam Moore is putting through the Doolittle-Brady bill for his especial benefit. The subject of this bill is still a secret. It was discussed at the dinner that Peter J. Brady, president of the Federation Bank and Trust Company, New York, gave in honor of Jimmy to wish him success in commercial life, but is not yet to be disclosed to the public. But when it comes up, vote for the Doolittle-Brady bill. It will make life brighter all 'round.

After his participation in the 1921 battleship bombings off the Virginia Capes, Jimmy flew from Jacksonville, Florida, to San Diego, California, in twenty-two hours and thirty-five minutes, which included a stop of one hour and fifteen minutes at Kelly Field for gas. He was the first pilot to cross the American continent within an elapsed time of twenty-four hours, and the only man who was so anxious to leave Florida for California that he flew there in one day. Seven years later he was awarded the Distinguished Flying Cross for this feat, which was a great help to the real estate business of California.

In 1925 Jimmy won the Schneider Trophy Race at Baltimore, now graced by the presence of the sainted Glenn L. Martin, which doubtless will assure the town of being spared if we ever have another flood. Jimmy made 232 miles per hour over the closed course and 245.71 over the straightaway, a remarkable achievement at that time. His excellent work in South America I mentioned in a recent article, so I'll not repeat that part. In 1923 he went to Boston Tech for a course in aeronautical engineering under the great Ed. Warner and came out so full of information that they simply had to call him Dr. Doolittle. Studying under Professor Warner left Jimmy in such a fog that he was selected to solve the problem of fog flying for the Guggenheim Fund. The Air Corps thought so highly of this test that it asked him to try it all over again for the Army, as the Army has been in a heavy fog for quite a while. I mean the non-flying part of the Army, of course.

Lieut. James H. Doolittle—"Jimmy"

Jimmy is a member of the Caterpillar Club, did you know? He joined during the National Air Races at Cleveland, when the wings parted company with the pursuit ship he was stunting. He just asked for another plane and went on up and put on a show for the crowd. Now that he is with the Shell company and in commercial aviation I venture to hope that he will cut out the stunts. I believe that stunts have served their purpose in aviation and that the time has come to get down to the serious business of selling plain and unadorned air transportation to the public. A few tank cars will supply all the gasoline needed for stunt ships. But trainloads will be needed to supply the commercial planes of this country if we can sell the public the idea that an airplane is not primarily something to get up and do things in. It's really just something to go places in.

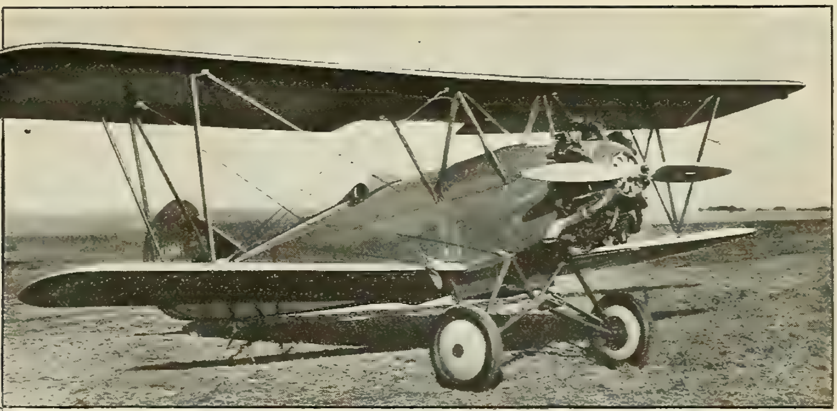
* * *

HERE'S a pilot's trade that is new to me—and I thought I knew them all: Technical Aviation Adviser to the Movies. Of course, if I'd thought of the matter at all, which I hadn't, I would have known that the trade had to exist, else how would the various flight pictures be filmed so accurately? Theodore S. Lundgren is the Q. B. who specializes in trading his technical knowledge for movie money; and recently he did work for "The Flying Horseman," starring Hoot Gibson and Ruth Elder. He was also technical adviser to the *Southern Cross* flight of 7,800 miles from Oakland, Calif., to Sidney, Australia, and to the American endurance record, San Diego, Calif., in October 1928, Pilots Brock and Schlee, fifty-nine hours and thirty-two minutes.

Lundgren, who was a pilot in the U. S. Army from 1917 to 1919, contemplated a flight from California to Australia in a large twin-motored triplane, *Spirit of Los Angeles,* acting as navigator and co-pilot. The plane was entered in the Dole Disaster, and the proposed flight was to be continued to Australia, after Mr. Dole's pineapples had been advertised by a stop at Hawaii But man proposes and Chance disposes; with the result that the *Spirit of Los Angeles* became indeed a spirit, the mere ghost of an idea, when it crashed and was totally wrecked in San Francisco bay. I think that's the only reason we have Ted Lundgren still with us.

The Lundgren Drift Pelorous, an instrument for checking the drift of a plane by celestial bodies, was used by Harry W

(Continued on next page)



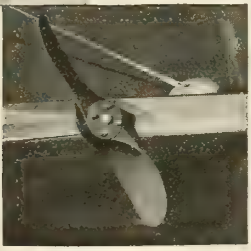
A FIGHTING PLANE FOR "KING COTTON"

Cotton—monarch of the South—against a ruthless insect enemy . . . no quarter in this fight! Growers grimly striving to save fractions of their crops with methods laborious, costly—too slow! The inroads of weevils and leaf worms grew yearly more deadly, more devastating. Then a new ally took up the challenge. Travel Air—*The Cotton Duster,* battleplane of agriculture, turned the tide!

Each year, insect pests are now controlled, crops are saved, and commercial aviation gains a new activity—profitable to all concerned. It is officially estimated that $15,000,000 will be spent this year in crop dusting.

Travel Air—always in the van of developments—designed and built *The Cotton Duster* especially for this new, crop-saving profession. Reliability rides with its 225 H. P. Wright Whirlwind engine. Speed up to 128 miles an hour and 480-mile cruising range mean quick service and a large commercial territory. Its spacious powder bin carries 600 pounds of destruction to insects at a single loading. Its dusting apparatus is simple, efficient and sure in action. And for protection of investment, all parts of the fuselage are made dustproof, amply protected against any corrosive effect from the chemicals used.

Individuals and organizations now engaged in commercial crop dusting, as well as commercial operators seeking new fields of activity, can profit by further investigation of *The Cotton Duster.* Its economy of operation means greater profits. Its sturdy construction will outlast many makeshifts. Its special-design efficiency makes it a favorite in competitive territory.



A small, wind-driven propeller operates the dusting mechanism

Full details of operating costs as well as information concerning the profits to be made in this established branch of commercial flying will be gladly furnished on request. Address Dept. T-70.

TRAVEL AIR COMPANY
Division of CURTISS-WRIGHT
Sales Offices: 27 W. 57th St., New York

A PLANE FOR EVERY PURPOSE TRAVEL AIR

(PersonAIRlities continued)

Lyon, navigator of the *Southern Cross.* For the benefit of my young friend Virgil Camm, who frequently gets the meanings of words mixed, I will state that by "celestial bodies" I do not refer to those of Mack Sennett's Bathing Beauties. I refer to the stars, Virgil. We should keep our minds on the stars —and leave the extras alone. Still, as Mr. Pantages said, it's the little extras that make life interesting.

* * *

C. W. Buckley

THE frown that makes C. W. Buckley look so serious is, he tells me, caused by unusually heavy pistol smoke that hovers around the Chicago airport. He was born, for no apparent good reason, October 15, 1897, in Hollister, California, and is therefore one of that select fraternity known as Native Sons. After the usual grade and high school training, he attended Leland Stanford University at Palo Alto, Calif., where unfortunately the weather is too mild to permit of students getting the most out of a college course; they miss the cultural benefits accruing from the wearing of a coonskin coat. For this reason, they get a lower tuition rate than that charged at Harvard or Yale, but even so, it doesn't make up for what they miss. When a student from Leland Stanford meets a student from Yale, he takes one look at the Yale man's coonskin and then slinks away in despair and becomes a bond salesman. After which there is absolutely no hope for him.

Buckley was just saved from this fate only by the intervention of the war, which caused him to break his slate and make the firm resolve to learn nothing more. In order to make sure that no further information came his way, he entered the Army as an enlisted man, prepared to work right up to general. That was in April, 1917. He was just in time to wash a lot of crockery and to give Rockwell Field, San Diego, a thorough going over with a hand rake, before they sent him to a ground school at Berkeley, Calif., to do squads right, guard mount, and other diversions calculated to make him an efficient pilot. He survived this training, went to Taylor Field, Montgomery, Ala., and finally became a pilot of such skill that they immediately made him an instructor and held him at Taylor Field until after the Armistice. When word reached Baron Von Richtofen that Buckley was not to be sent against him, his feeling of relief may better be imagined than described; in fact, history tells us that the Baron, who had been somewhat moody since he learned of Buckley's enlistment, cheered up amazingly and ordered another beer.

Aprez la guerre finnee—in Montgomery, Alabama,—Buckley was discharged and returned to California, only to enlist as sergeant-major with the 91st observation Squadron at Mather Field, Sacramento, Cal. As he had only been a mere Lootie before, this may be regarded as a promotion—there were thousands of Loots and only comparatively few sergeant-majors, which, I suspect from my own experience with them, was just as well. Buckley was the first pilot to fly forest patrols, using the high-powered and death-defying Jenny, and was the first N. C. O. to fly across the Sierra Nevada mountains. Just what good all this did him, I don't know. They sent him down to the Mexican border to do patrols, and then let him out in March 1920. After which he got a Jenny and did barnstorming, worked later on Ford's freight lines from Buffalo to Chicago, flew with the federals in Mexico, flew the Chicago-Cleveland and Chicago-Minneapolis runs for Universal, flew for Pan American Airways on the Miami to Havana run, and then on the San Juan, Porto Rico, to Santiago, Cuba, line. He was transferred to the Central America division, flying the run that takes in such interesting places as Cristobal, Canal Zone, Panama, Buenta Arenas, Costa Rica, and Managua, Nicaragua, where the Marine Corps works for the New York bankers and the humble taxpayer foots the bills.

* * *

W. H. Lee

"OVERWHELMED by the innate modesty which is so conspicuous in aviators, traveling salesmen, and movie actresses," writes Pilot W. H. Lee, of Albany, Georgia, "I am hesitatingly penning this, my biography, as you request it. I lived for many years in that reserved and diffident city known as Atlanta, Georgia, where I was a merchandise broker, selling groceries to the wholesale trade. The grocery jobbing business is in such a hectic state, one is up in the air most of the time anyway, so I just naturally took up flying three years ago. I am the protegé of several of the best known flying instructors in the country—Beeler Blevins, Douglas Davis, "Army" Armstrong, John Pricer, et al. All of these could claim the distinction of teaching me to fly, and as long as I stay on the ground some of them do admit it. But I have been told that all of them deny it as soon as I get in the air. Anyway, I finally got my papers from Washington letting me go across the state line, and anyone who can pull right and left tailspins under the steel cold eyes of Leo C. Wilson, inspector for the Department of Commerce, sure has to cram in his ten-hour course.

"Somebody let it out that I was a wonderful sales director, so I was drafted to Albany, Ga., as sales manager for the National Pecan Growers Exchange, a coöperative organization of 1,300 pecan growers, who have more pecans than one would think grow in the whole world. They gave me a sample case and told me to go out and sell pecans to every wholesale grocer in the United States. The Boss wanted to know what train I was going to take. When I told him I was going in a plane, he looked hopeless for a few minutes and then remarked something about the sample case being worth $35, but this was partly lost in the whirr of my trusty OX-5. Then away to Atlanta, Chattanooga, Roanoke, Washington, New York, Albany, Buffalo, Cleveland, Detroit, Toledo, Columbus, Cincinnatti, Indianapolis, Chicago, Milwaukee, Minneapolis and St. Paul, Omaha, Kansas City, St. Louis, Louisville, Evansville, Nashville, then back to Albany. I came back home with more orders for pecans than had ever been sold in a like time before in the history of the world. Flying is the greatest sport I have ever indulged in; and I know of nothing that has more thrills in it."

EARLY BIRDS

ANYONE who has flown in a modern Cessna cabin monoplane will be interested in Clyde V. Cessna's own account of his early struggles which have culminated in the truly excellent Cessna of today. Incidentally, when Clyde flies himself, did you know that the rudder wires have to be crossed? That's the only way he can fly. He says the way we turn is all wrong. To turn to the left, the rest of us push with our left foot. That's wrong, Clyde says, because it's directly opposite to the way we steer automobiles. We should push with our right foot to turn the plane to the left; that's the natural movement. Of course Clyde is right; the rest of us merely started wrong. When you turn to the left in a car, don't you push the wheel forward with your right hand? The wheel turns in the direction in which you want the auto to turn. Same with a horse, you let out on the right rein and pull in on the left to make a left turn. In the plane we should do the same—push it around. Only, we all started wrong and now must continue the wrong way we started. Clyde Cessna is the only man in the world who turns an airplane the right way! We're all out of step but Clyde. I'm not joking about this—it's perfectly clear to me that Clyde is right.

Clyde Cessna took up aviation in the fall of 1910, working in the Queen Airplane plant at Bronx Park, N. Y. Buying some parts there, he constructed his first plane that winter at Enid, Oklahoma, and used the great salt plains near Cherokee for his flying field, because it had a very smooth area, though its white glitter made it a terrific strain on the eyes, and the heat in summer was almost unbearable.

"I had many trials and heartbreaking experiences and as many wrecks," he says, "for a wreck was as sure to occur as was the trial. One trial, one wreck, was about

(Continued on next page)

Now for you . . the NEW FOUR PLACE CURTISS ROBIN

These Outstanding Features Make the New "Robin" America's Finest Light Cabin Plane.

1. New width of fuselage with greater cabin room.
2. Cabin-width benches with deep cushions, upholstered in broadcloth.
3. All windows of triplex non-shatterable glass.
4. Large amber glass skylight.
5. Cabin temperature control system.
6. Luggage compartment.
7. New "V" type windshield.
8. New design instrument board.
9. Adjustable pilots' seat.
10. Side-by-side dual stick controls.
11. Rudder pedals automobile-type.
12. Right-hand stick and pedals easily detachable.
13. Left rudder pedals connecting with heel-type brakes.
14. Landing Gear has large Bendix wheels with Bendix brakes operating independently on each wheel.
15. "Oleo" tail wheel for easy taxying.
16. Powered with the new 185 h. p. Curtiss Challenger engine.

THE four-place Robin was displayed publicly for the first time at the recent St. Louis Aircraft Exposition. It was constantly the center of an admiring group of pilots, commercial operators and the air-minded public generally. Now, this same new Robin is in production, ready for commercial leadership—ready for your ownership.

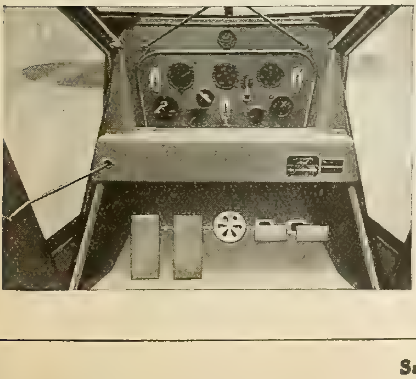
In the 1930 Robin are incorporated all the fine flying qualities which brought fame and popularity to the three-place Robin, holder of the World Endurance Record—the same grace of outline, ruggedness of construction and reliability of performance. Its 185 h. p. Curtiss Challenger power has become a by-word of dependability with economy of operation. To these inherent qualities have been added the many special features listed in the panel at the side of this page.

Handsome, sturdy, built to Curtiss-Wright standards of airworthiness and performance, the 1930 Robin—four-place—meets the most exacting demand for economical airplane service, yet possesses refinements and appointments heretofore associated only with the most costly and most luxurious air liners. In all branches of commercial use, the new Robin will bring a new pride of possession both in flying pleasure and greater profits earned.

Price **$7,995**

For further details address Dept. R- 70

CURTISS-ROBERTSON AIRPLANE
MANUFACTURING COMPANY
Division of CURTISS-WRIGHT
27 West 57th Street • New York



CURTISS ROBIN

For Business
Pleasure
Training

(PersonAIRlities continued)

the proportion, for in those days there was no such thing as aircraft information available, or any aircraft magazines. In fact, I approached this subject with no more knowledge of the problem than a nursing babe. My experiences there on those salt plains in rebuilding and attempting to fly with an Elbridge two-cycle engine, which would overheat in about ten minutes of operation, was one that I shall never forget. I believe I have a lot of friends who recall those trying days who sympathized with me at that time and do yet for the hardships I incurred during that summer of intensive training. Many a time I found it necessary to spend what little money I had for repairs instead of for something to eat. It was a common occurrence at our camp, which consisted of my brother and myself, to salt our flap-jacks with the crude salt taken from the surface of the salt plains.

"But, as the old saying goes, the longest road must have an ending. My road ended in a terrific crash one day, after attempting to make a circle with my under-powered plane, which slipped on down to the ground and rolled over a few times on its way to a complete washout. This disabled me for several months, but as soon as I was able to be around, I began planning a new and better ship, which I built in my garage the following winter. This ship was powered with the same Elbridge motor, but as I had learned considerable, the ship proved to be a success and flew very nicely the first time it was taken out. However, I was rather nervous, and in my first attempt I found I was corralled by high tension wires before me and to the side of me; and in making a low turn was forced down-wind to a landing that resulted in capsizing my ship on top of me in a dry creek. Without much damage, the ship was hauled out, and a few days later I successfully piloted it in a five-mile circle, making a perfect landing. I flew this ship the balance of the season at small town picnics and fairs, which netted me sufficient funds to purchase a new motor and build a new ship for the following season. My further experience and greater power in the new engine enabled me to build a ship that really flew as it should fly. I planned each year to build a new ship through the winter months to fly at fairs the following summer seasons. This I continued to do for some five years, and it finally resulted in my present occupation."

* * *

C. R. Borkland

C. R. BORKLAND started flying in 1907 or '08, but at first had to let the airplane fly while he stood on the ground and watched it; which is merely a nut way of saying that he flew models, like George McLaughlin, who also was very young at that time. Then in 1910 he graduated to gliders and became one of that daring crew composed of John Carisi, Jean Roche, Charles Ragot, Percy Pierce and Cecil Peoli—all people with something the matter with them. Borkland flew the New York Model Aero Club glider at Staten Island until Russell Holdermann, now at Le Roy, N. Y., cracked it up. George Post fitted in with that bunch, though he now walks about with an Edo pontoon under each arm and a Free Bottom Craft towing behind. In 1911 Borkland brought the Model Hydro Record from England to the U. S., where it still remains.

In 1917, the world having become unsafe for Democracy and quite a few of the rest of us, the bold Borkland leaped into the fray to fix things up. He joined the Royal Flying Corps, which was considerably heartened by his arrival, and thenceforth flew at random over Canada, the United States, England, Scotland, and France in the interests of said Democracy until it was rendered so safe that the Republicans rode into power and the thing was forgotten. In 1919 Borkland, who had served with 54 and 43 Squadrons, returned to America to receive the reward due him as a hero of the Great Conflict. He got the same reward handed out to the rest of us, and gained no weight on it. He also went into what was humorously referred to as commercial aviation, in 1919 and '22, and helped organize the Ralph C. Diggins Aviation Company which did instruction, photography, cross-country hops, barnstorming, racing railway trains with movie pictures of prize fights, and other noble experiments that brought in very little cash. Noticing this, the astute Borkland left the game and went into business, using a ship only for pleasure, until he organized Air Activities, Inc., in Chicago in 1928, made a trip to Europe to test old vintages for Nicholas-Beazley in 1929, and later joined the staff of the American Eagle Aircraft Corporation in Kansas City, renowned as the home of that sterling character and home-wrecker, Mr. Blaine Tuxhorn, than which there is no than whicher. Mr. Tuxhorn is the author of that great song hit, "Simmons beds are built for sleep, but I use two chairs by the elevator."

* * *

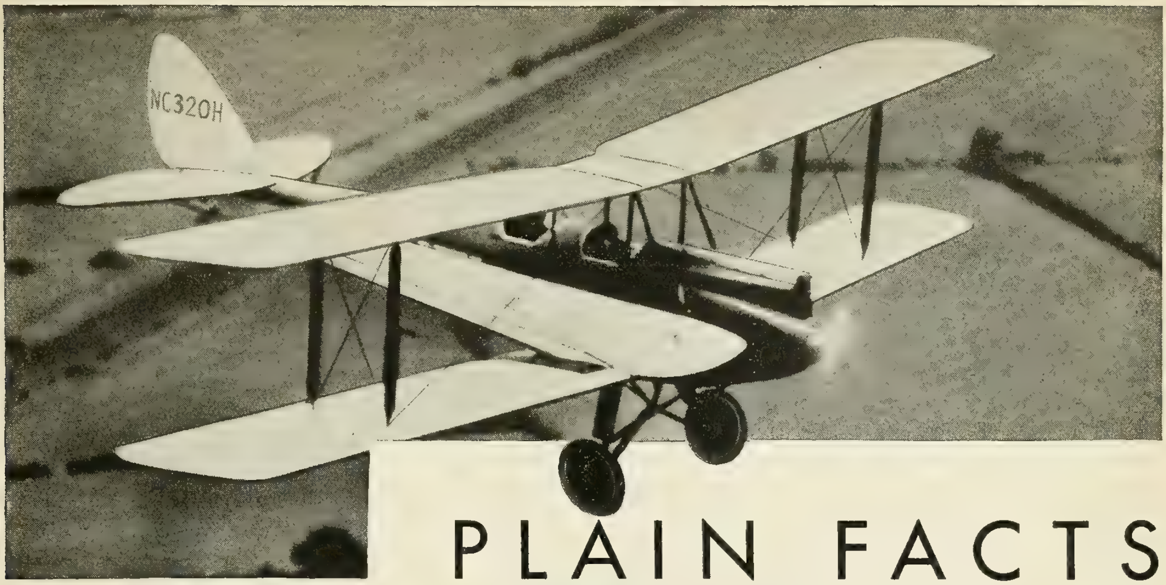
Augustus Post

IN 1914 a man wrote a prophecy that was uncanny in the accuracy with which it forecast Lindbergh's flight to Paris. He wrote "A man is now living who will be the first human being to cross the Atlantic through the air. He will cross while he is still a young man. All at once Europe will move two days nearer: instead of five days away, it will be distant only thirty hours. It would seem out of keeping with the general economy of weight, when even the parts are not duplicated, that the pilot should be carried in duplicate. As for keeping awake and alert for the whole time of the flight, every aeronaut knows that this is possible.

"Imagine, then, the welcome that awaits the Columbus of the air! The cables warn of his departure, before him flies the wireless announcing his progress. Ship after ship, waiting the great moment, catches glimpses of the black dot in the sky: ocean steamers, bearing each a cityful of human beings, train thousands of glasses on the tiny winged thing, advance herald of the aerial age. Above all he rides, solitary, intent. There will be no time to decorate for his coming; flags will be run up hurriedly, roofs in an instant turn black with people, wharves and streets white with upturned faces, while over the heads of the multitude he rides in, to such a shout as the ear of man never heard. No explorer ever knew such a welcome, no conqueror, as awaits the Columbus of the Air."

The man who wrote that amazing prophecy in 1914 was Augustus Post. He was uncannily correct in every statement except his opening one—for Lindbergh was not the first human being to cross the Atlantic through the air; he was the sixty-seventh. As all of the six readers will instantly take pen in hand to correct me, I'd better add now that Alcock and Brown, the crew of the NC-4, and the crews of the English dirigible and the present *Los Angeles* made in all sixty-six men who crossed the Atlantic by air before Lindbergh. Lindbergh was the first, and is still the only one, to cross the Atlantic non-stop, alone, from New York to Paris. It is an odd comment on human nature that practically everyone outside of aviation believes that Lindbergh was the first to cross the Atlantic. The sixty-six ahead of him are forgotten! And so are the ones who followed him!

Augustus Post, prophet and balloonist, was a charter member and incorporator of the old Aero Club of America, and its first secretary over a period of twenty years. He was official observer at the first flight of Curtiss' "June Bug" with Dr. Alexander Graham Bell, inventor of the telephone and wrong numbers, and of the Wright's Fort Meyer flights. In 1910 he flew at Hammondsport and in meets at Sheepshead Bay, Squantum, Chicago, Cleveland and New Orleans. Aide to Alan R. Hawley, winner of Gordon-Bennett Balloon Race, 1910, flying or floating 1,172 miles from St. Louis to Lake Tchotogama, Quebec. He stayed there almost long enough to learn to pronounce the name, because he was lost in the Labrador for ten days after landing there. He varied his activities by falling 3,000 feet into Berlin, Germany, when the balloon *Conqueror* failed to live up to its name, and burst; and he operated a dirigible for Major Baldwin, 1909. In 1919 he drew up the rules for the New York-Paris Flight, Raymond Orteig prize, which was won by the young man mentioned in his prophecy of 1914. Mr. Post has written many magazine articles on aviation, outside of which he seems to have led a blameless and useful life.



PLAIN FACTS
from the flying text-book D. H. MOTH

MEN who fly deal in facts. Promises have little place in their profession unless they are resolvable into actual performance. The following extracts from a letter written a few days ago by James H. Ritter, Operating Manager of Air Service, Inc., of Johnstown, Penn., bring to training school and commercial operators "actual performance" facts of the D. H. Gipsy Moth—facts that have made the Moth the acknowledged leader of America's training planes:

"We have used the D. H. Moth over 700 hours during the last nine months without any trouble whatsoever—most of this time in dual instruction and student's solo. We have had to buy no new engine parts. At 375 hours we gave it a top overhaul and found the engine in such good shape that it would have been good for as much more time without overhaul.

"In training, none of the students have required more than eight or nine hours of dual, although many of them could have soloed at five hours, were it not for regulations. All of our students who have completed their course—two of them women—have received their licenses. The Moth certainly stands up under student instruction wonderfully well—better than any plane it has been my privilege to observe.

"We have hauled over 1000 paid passengers in the Moth plane—most of them because they preferred the "slotted wing" to other planes not so equipped.

"In the Moth we average about six gallons of gasoline to the hour, and counting oil changes, about one pint of oil. With that kind of performance and results on a small field 1750 ft. above sea level, it is only natural that we should be somewhat biased on the side of the D. H. Gipsy Moth over any other light ship we know."

With 102 m. p. h. speed the Moth has a light ship's easy maneuverability and smooth control—with a rugged stamina under hard use which surpasses that of ships far heavier in weight and more expensive to own and operate. It is powered with the famous Gipsy engine and possesses remarkable stability through Handley-Page slotted wings and D. H. harmonized control surfaces. PRICE $3960

Handley-Page Wing Slots $240 Additional

For full information, address Dept. M-70

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Division of CURTISS-WRIGHT
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D.H.Gipsy MOTH

OFFICIAL WORLD AIR RECORDS

Confirmed by the Federation Aeronautique Internationale, January 1, 1930

CLASS A—BALLOONS

Grand "Free for All" Record

Duration (Germany) ....87 hrs.
H. Kaulen, Dec. 13-17, 1913.

Distance (Germany)..3,052.7 kms. (1,896.9 mi.)
Berliner, Feb. 8-10, 1914.

Altitude (Germany)
Height, 10,800 m. (35,424 ft.)
Suring and Berson, June 30, 1901.

First Category (600 Cubic Meters)

Duration (France).............22 hrs., 34 min.
G. Cormier, Aug. 10-11; 1924.

Distance (France) ......804.173 kms. (499.69 mi.)

Distance (France)....804.173 kms. (499.69 mi.)
Georges Cormier, July 1, 1922.

Altitude (No Record)

Second Category (601-900 Cubic Meters)

Duration (France).............23 hrs., 28 min.
Jules Dubois, May 14-15, 1922.

Distance (France)....804.173 kms. (499.69 mi.)
Georges Cormier, July 1, 1922.

Altitude (No Record)

Third Category (901-1,200 Cubic Meters)

Duration (United States).......26 hrs., 46 min.
E. J. Hill and A. G. Schlosser, Ford Airport to Montvale, Va., July 4-5, 1927.

Distance (United States)..920.5 kms. (572 mi.)
S. A. U. Rasmussen, Ford Airport to Hookerton, N. C., July 4-5, 1927.

Altitude (No Record)

Fourth Category (1,201-1,600 Cubic Mtrs.)

Duration (United States)........26 hrs., 46 min.
E. J. Hill and A. G. Schlosser, Ford Airport to Montvale, Va., July 4-5, 1927.

Distance (United States)..920.5 kms. (572 mi.)
S. A. U. Rasmussen, Ford Airport to Hookerton, N. C., July 4-5, 1927.

Altitude (No Record)

Fifth Category (1,601-2,200 Cubic Meters)

Duration (France) ....49 hrs.
Georges Blanchet and Dr. Geo. LeGallee, Gordon-Bennett, Detroit-Waverley Hall, Ga., Sept. 10, 11, 12, 1927.

Distance (United States)
1,531.768 kms. (952 mi.)
Lt. T. G. W. Settle and Ensign W. Bushnell, Pitt Stadium, Pittsburgh, Pa., to Savage Harbor, Prince Edward Island, Canada, May 4, 5, 6, 1929.

Altitude (No Record)

Sixth Category (2,201-3,000 Cubic Meters)

Duration (France) ....49 hrs.
Georges Blanchet and Dr. Geo. LeGallee, Detroit-Waverley Hall, Ga., Sept. 10, 11, 12, 1927.

Distance (United States)
1,531.768 kms. (952 mi.)
Lt. T. G. W. Settle and Ensign W. Bushnell, Pitt Stadium, Pittsburgh, Pa., to Savage Harbor, Prince Edward Island, Canada, May 4, 5, 6, 1929.

Altitude (United States)...8,690 m. (28,510 ft.)
Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., Mar. 9, 1927.

Seventh Category (3,001-4,000 Cubic Mtrs.)

Duration (France) ....49 hrs.
Georges Blanchet and Dr. Geo. LeGallee, Gordon-Bennett, Detroit-Waverley Hall, Ga., Sept. 10, 11, 12, 1927.

Distance (United States)
1,531.768 kms. (952 mi.)
Lt. T. G. W. Settle and Ensign W. Bushnell, Pitt Stadium, Pittsburgh, Pa., to Savage Harbor, Prince Edward Island, Canada, May 4, 5, 6, 1929.

Altitude (United States)...8,690 m. (28,510 ft.)
Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., Mar. 9, 1927.

Eighth Category (4,001-5,000 Cubic Mtrs.)

Duration (France) ....49 hrs.
Georges Blanchet and Dr. Geo. LeGallee, Gordon-Bennett, Detroit-Waverley Hall, Ga., Sept. 10, 11, 12, 1927.

Distance (United States)
1,531.768 kms. (952 mi.)
Lt. T. G. W. Settle and Ensign W. Bushnell, Pitt Stadium, Pittsburgh, Pa., to Savage Harbor, Prince Edward Island, Canada, May 4, 5, 6, 1929.

Altitude (United States)....8,690 m. (28,510 ft.)
Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., Mar. 9, 1927.

CLASS B—AIRSHIPS

Returning to Point of Departure

Duration (Germany) ....71 hrs., 7 min.
Dr. Eckener, Graf Zeppelin, Maybach, 5 motors, from Lakehurst, U.S.A., to Friedrichshafen, Germany, Nov. 29, 30, 31, 1928.

Distance (Germany)....6,384.5 kms. (3,967 mi.)
Dr. Eckener, Graf Zeppelin, Maybach, 5 motors, from Lakehurst, U.S.A., to Friedrichshafen, Germany, No. 29, 30, 31, 1928.

Altitude (France) ....3,080 m. (10,102 ft.)
Cohen, at Conte, June 18, 1912. ..

CLASS C—AIRPLANES

Returning to Point of Departure Without Refueling

Duration (Germany) ....65 hrs., 25 min.
Johann Risticz and Wilhelm Zimmerman, Junkers W-33, Junkers LV 280 HP, at Dessau, July 5, 6, 7, 1928.

Distance (Closed Circuit) (Italy)
7.666.6 kms. (4.763.7 mi.)
Arturo Ferrarin and Carlo Del Prete, Savoia-Marchetti, S-64, Fiat A-22, Course Casale dei Prati, Torre Flaria, Fara d'Anzio, May 31, June 1, 2, 1928.

Distance (Airline) (France)
7,905.140 kms. (4,948.590 mi.)
Coste and Bellonte, Breguet 19, 600 HP, Hispano-Suiza engine, Le Bourget to Coulart, China, Sept. 27, 28, 29, 1929.

Altitude (Germany).......12,739 m. (41,794 ft.)
Willi Neuenhofen, Junkers W34, monoplane, Bristol-Jupiter 420 HP, at Dessau, May 25, 1929.

Maximum Speed (France)
448.171 k.p.h. (278.480 m.p.h.)
Warrant Officer Bonnett, Ferbois monoplane, Hispano-Suiza, 550 HP, at Istres, France, Dec. 11, 1924.

SPEEDS FOR SPECIFIED DISTANCES WITHOUT PAYLOAD

Speed for 100 kms. (United States)
401.279 k.p.h. (249.342 m.p.h.)
Lt. Cyrus Bettis, U.S.A.S., Curtiss R3C-1, Curtiss V-1400, 500 HP, Mitchel Field, October 12, 1925.

Speed for 500 kms. (France)
306.696 k.p.h. (190.567 m.p.h.)
Sadi-LeCointe, Nieuport Delage, Hispano-Suiza, 500 HP, at Istres, June 23, 1924.

Speed for 1,000 kms. (France)
248.292 k.p.h. (154.293 m.p.h.)
Fernand Lasne, Nieuport-Delage, 42C-1, Hispano-Suiza, 500 HP, Etampes, Aug. 29, 1925.

Speed for 2,000 kms. (France)
218.759 k.p.h. (135.930 m.p.h.)
Fernand Lasne, Nieuport-Delage, 42C-1, Hispano-Suiza, 500 HP, Etampes, Sept. 12, 1924.

Speed for 5,000 kms. (France)
188.097 k.p.h. (116.822 m.p.h.)
Commandants Girler and Weiss, Breguet Hispano-Suiza, 600 HP, ·Etampes, May 24, 25, 1929.

CLASS C—WITH PAYLOAD* OF 500 KILOGRAMS (1,102.31 Lbs.)

* Payload or ballast exclusive of pilot, gasoline and oil.

Returning to Point of Departure

Duration (Germany)....22 hrs., 11 min., 45 sec.
W. K. Schnabele and Fritz Loose, Junkers W-35, Junkers L-5 engine, 320 HP, at Dessau, Mar. 21, 22, 1927.

Distance (Germany)..2,735.586 kms. (1,699.81 mi.)
W. K. Schnabele and Fritz Loose, Junkers W-35, Junkers L-5 engine, 320 HP, at Dessau, March 21, 22, 1927.

Altitude (France)..........9,374 m. (30,654 ft.)
J. Burtin, Breguet 19, Farman 500 HP, Toussus-le-noble, Aug. 23, 1929.

Speed for Specified Distances

***Speed for 100 kms.** (United States)
298.392 k.p.h. (185.452 m.p.h.)
Lee Schoenhair, Lockheed Vega, P&W Wasp, 420HP, at Jacksonville, Fla., Feb. 18, 1930.

***Speed for 500 kms.** (United States)
275.505 k.p.h. (171.228 m.p.h.)
Lee Schoenhair, Lockheed Vega, P&W Wasp, 420HP, at Jacksonville, Fla., Feb. 18, 1930.

***Speed for 1,000 kms.** (United States)
245.697 k.p.h. (152.702 m.p.h)
Lee Schoenhair, Lockheed Vega, P&W Wasp, 420 HP, at Jacksonville, Fla., Feb. 20, 1930.

Speed for 2,000 kms. (Germany)
205.407 k.p.h. (127.632 m.p.h.)
H. Steindorff, Rohrbach-Roland, 3 BMW, 230 HP each, at Staaken, July 31, 1927.

Speed for 5,000 kms. (No Record)

CLASS C—WITH PAYLOAD OF 1,000 KILOGRAMS (2,204.12 Lbs.)

Returning to Point of Departure

Duration (Germany) .. 14 hrs., 23 min., 45 sec.
Fritz Horn, Junkers G-24, 3 Junkers L-11, 230 HP ea. at Dessau, Apr. 4, 1927.

Distance (Germany) 2,315.338 kms. (1,438.680 mi.)
H. Steindorff, Rohrbach-Roland 3 BMW 230 HP, ea. at Staaken, July 31, 1927.

Altitude (France) ...... 8,089 m. (26,538 ft.)
J. Burtin, Breguet 19, Farman, 600 HP, Toussus-le-noble, July 26, 1929.

Speed for Specified Distances

***Speed for 100 kms.** (United States)
283.197 k:p:h. (175.997 m.p.h.)
Lee Schoenhair, Lockheed Vega, P&W Wasp, 420 HP, at Jacksonville, Fla., Feb. 20, 1930.

***Speed for 500 kms.** (United States)
270.495 k.p.h. (168.114 m.p.h.)
Lee Schoenhair, Lockheed Vega, P&W Wasp, 420 HP, at Jacksonville, Fla., Feb. 20, 1930.

Speed for 1,000 kms. (United States)
245.697 k.p.h. (152.702 m.p.h.)
Lee Schoenhair, Lockheed Vega, P&W Wasp, 420 HP, at Jacksonville, Fla., Feb. 20, 1930.

Speed for 2,000 kms. (Germany)
205.407 k.p.h. (127.632 m.p.h)
Herman Steindorff, Rohrbach-Roland, 3 BMW, 230 HP ea. at Staaken, July 31, 1927.

Speed for 5,000 kms. (No Record)

CLASS C—WITH PAYLOAD OF 2,000 KILOGRAMS (4,409.24 Lbs.)

Returning to Point of Departure

Duration (Germany) .. 13 hrs., 1 min., 12.8 sec.
J. Risticz, Junkers, G-24, Junkers 280 HP at Dessau, June 20, 1927.

Distance (Germany) 1,750.469 kms. (1,087.68 mi.)
Herman Steindorff, Rohrbach-Roland, 3 BMW 230 HP at Staaken, July 31, 1927.

Altitude (Italy).............6,262 m. (20,544 ft.)
Demonico, Antonini, Caproni CA-73, 2 Isotta Franschini, 500 HP ea. at Cascina Malpensa, May 26, 1927.

Speed for Specified Distances

Speed for 100 kms. (France)
223.546 k.p.h. (138.904 m.p.h.)
Paillard and Camplan, "Bernard" 190 T Hispano-Suiza, 600 HP, LeBourget to Gondreville, Nov. 23, 1928.

Speed for 500 kms. (Germany)
215.378 k.p.h. (133.828 m.p.h.)
Herman Steindorff, Rohrbach-Roland, 3 BMW, 230 HP ea. at Staaken, July 28, 1927.

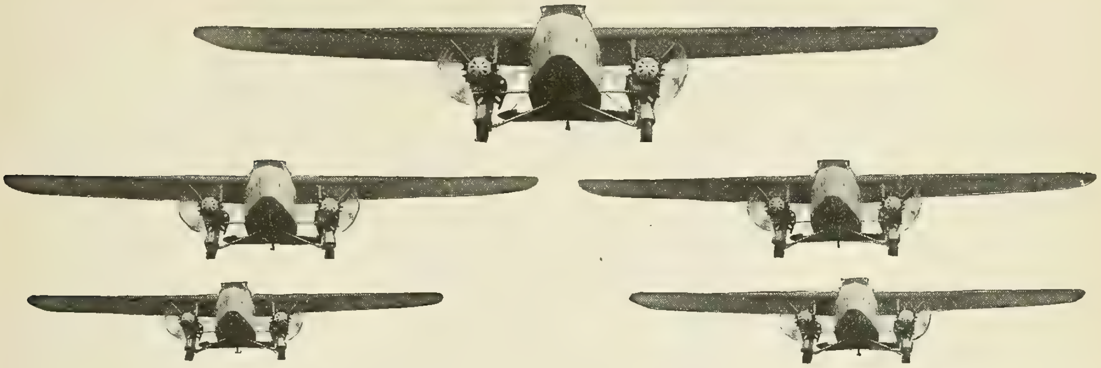
Speed for 1,000 kms. (Germany)
214.855 k.p.h. (133.504 m.p.h.)
Herman Steindorff, Rohrbach-Roland, 3 BMW 230 HP ea. at Staaken, July 28, 1927.

CLASS C—WITH PAYLOAD OF 5,000 KILOGRAMS (11,023 Lbs.)

Duration (France) ...... 1 hr., 12 min., 21 sec.
L. Bossoutrot, Super Farman-Goliath, 4 Farman 500 HP ea., at LeBourget, Nov. 16, 1925.

(*Continued on next page*)

**Officially calibrated by the National Aeronautic Association and forwarded to the Federation Aeronautique Internationale for homolgation.*



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Western Air Express will soon be in possession of five F-32's, the first of a fleet being built by the Fokker Aircraft Corporation of America, (the F-32 has a wing-spread of 99 feet, develops 2,300 horse-power and carries 30 passengers, pilot and co-pilot).

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Official World Records

(Continued from preceding page)

Altitude (France) ...... 3,586 m. (11,765 ft.) L. Bossoutrot, Super Farman-Goliath, 4 Farman 500 HP ea. at LeBourget, Nov. 16, 1925.

Speed for 100 kms. (No Record)

Speed for 500 kms. (No Record)

CLASS C—GREATEST PAYLOAD CARRIED TO AN ALTITUDE OF 2,000 METERS (6,671.7 Ft.)

France..................6,000 kgs. (13,228 lbs.) L. Bossoutrot, Super Farman-Goliath, 4 Farman 500 HP ea. at LeBourget, Nov. 16, 1925.

CLASS C—REFUELING IN FLIGHT

Returning to Point of Departure

Duration (United States) .... 420 hrs., 17 min. Dale Jackson and Forest O'Brine, "St. Louis Robin No. 1," Curtiss-Robertson radial engine, 170 HP, Lambert Field, St. Louis, Mo., July 13-30, 1929.

Distance (United States) 5,300 kms. (3,293.26 mi.) Lts. Smith and Richter, U.S.A., DH-4B Liberty 400 HP at Rockwell Field, San Diego, Calif., August 27-28, 1923.

RECORDS FOR LIGHT AIRPLANES CLASS C—FIRST CATEGORY

Two Seaters—Weight Empty Less Than 400 kgs. (881 lbs.)

Distance (Closed Circuit) (Germany) 1,601 kms. (995 mi.) Cornelius Edzard, Focke-Wulf S-24, "Kiebitz" Siemens 80 HP motor, at Bremen, Aug. 20, 1929.

Distance (Airline) (Switzerland) Capt. Hans Wirth and Melle Erika Nauman, Klemm-Daimler, Monoplane Mercedes-Daimler, 20 HP, Boblingen Airport to Mieschkance, Poland, October 16, 1928.

Altitude (Gt. Britain) .. 6,054 m. (19,862 ft.) Capt. G. DeHaviland and Mrs. DeHaviland, DHMoth 60 G, DH Gypsy, 85 HP, at Stag Lane, July 27, 1928.

*Speed for 100 kms. (United States) 204.262 k.p.h. (126.95 m.p.h.) Willfred G. Moore, Inland Sport Monoplane, LeBlond 90, at Kansas City Municipal Airport, Kansas City, Mo., Feb. 12, 1930.

LIGHT AIRPLANES CLASS C—SECOND CATEGORY

Single Seaters—Weight Empty Less Than 200 kgs. (440 lbs.)

Distance (Closed Circuit) (Hungary) 650 k.m.s. (403.9 mi.) Chas. Kaszala, Lampich, monoplane, Thorutzkai engine, 18 HP at Budapest, Sept. 14, 1927.

Distance (Airline) (Hungary) 517.04 kms. (321.3 mi.) Chas. Kaszala, Lampich H-MAFD, Thorutzkai 18 HP, Budapest-Pola, June 14, 1928.

Altitude (Poland) ...... 4,004 m. (13,254 ft.) Lt. F. H. Zwirkoct, A. Kocjan, RWD-2 Salmson 40 HP, at Varsovic, Oct. 19, 1929.

Speed for 100 kms. (No Record)

LIGHT AIRPLANES CLASS C—THIRD CATEGORY

Single Seaters—Weight Empty 200-350 kgs., Incl. (440-771 lbs.)

Distance (Closed Circuit) (Czechoslovakia) 2,500 kms. (1,553 mi.) Commandant Vichereck "Avia" BH-11B, Walter 60 HP, at Prague, June 6-7, 1928.

Distance (Airline) (United States) 2,655 kms. (1,650 mi.) D. S. Zimmerly, Barling NB-3 landplane, 80 HP Genet engine, Brownsville, Texas, to Winnipeg City, Canada, July 17, 1929.

*Altitude (United States)....7,337 m. (24,074 ft.) D. S. Zimmerly, Barling NB-3 landplane, Lambert 90 HP, at St. Louis, Mo., Feb. 16, 1930.

Speed for 100 kms. (Gt. Britain) 300.1 k.p.h. (186.47 m.p.h.) Capt. H. S. Broad, DH "Tiger Moth" DH 32 engine 130 HP at Stag Lane, Aug. 24, 1927.

CLASS C2—SEAPLANES

Returning to Point of Departure Without Refueling

Duration (United States) ...... 36 hrs., 1 min. Lts. Arthur Gavin and Zeus Soucek, Navy PN-12, 2 Wright R-1,750, 525 HP ea., at Philadelphia, May 3-4-5, 1928.

Distance (United States) 2,525 kms. (1,569 mi.) Lts. B. J. Connell and H. C. Rodd, PN-10, 2 Packard 600 HP ea. at San Diego, Calif., Aug. 15-16, 1927.

Distance (Airline) (United States) 2,963 kms. (1,841 mi.) Comdr. John Rodgers, U.S.N., and Lt. B. J. Connell, PN-9, 2 Packard 1-A-1,500, 500 HP ea., San Pablo Bay, Calif., to near Hawaii, Aug. 31-Sept. 1, 1925.

Altitude (United States) 11.753 m. (38,561.593 ft.) Lt. Apollo Soucek, U.S.N., Wright "Apache," Pratt & Whitney 425 HP supercharged, at Washington, D. C., June 4, 1929.

Maximum Speed (England) 575.7 k.p.h. (357.723 m.p.h.) Squadron Leader A. H. Orlebar, Supermarine Rolls Royce S-6, Rolls Royce "R"6, Spithead, Sept. 12, 1929.

SPEED FOR SPECIFIED DISTANCES

Speed for 100 kms. (Gt. Britain) 531.200 k.p.h. (330.072 m.p.h.) Flying Officer H.R.D. Waghorn, Supermarine monoplane, Royce S.6, Rolls Royce R motor, Spithead, Sept. 7, 1929.

Speed for 500 kms. (United States) 259.328 k.p.h. (161.14 m.p.h.) Lt. R. A. Ofstie, Curtiss Navy C-3, Seaplane, Curtiss D-12, 450 HP at Bay Shore, Baltimore, Md., Oct. 25, 1924.

Speed for 1,000 kms. (Germany) 222.277 k.p.h. (138.116 m.p.h.) Rolf Starke, Heinkel HE 9, BMW VI-600 HP, Warnemunde, June 10, 1929.

Speed for 2,000 kms. (Switzerland) 172.00 k.p.h. (106.875 m.p.h) Richard Wagner and Georges Zinsmaier, Dornier "Merkur" BMW 500-600 HP at Altenrheim, Aug. 10, 1927.

Speed for 5,000 kms. (No Record)

CLASS C2—WITH PAYLOAD* OF 500 KILOGRAMS (1,102.31 Lbs.)

Pay load or ballast exclusive of pilot, gasoline and oil.

Returning to Point of Departure

Duration (United States)..20 hrs., 45 min., 40 sec. Lts. B. J. Connell and H. C. Rodd, PN-10 2 Packard, 600 HP ea., at San Diego, Calif., Aug. 15-16, 1927.

Distance (United States) 2,525 kms. (1,569 mi.) Lts. B. J. Connell and H. C. Rodd PN-10 2 Packard, 600 HP ea., at San Diego, Calif., Aug. 15-16, 1927.

Altitude (Germany) .... 7,458 m. (27,749 ft.) Fritz Harder, Junkers W-34, Bristol Jupiter VII, 420 HP at Dessau, Nov. 6, 1928.

Speed for 100 kil. (Germany) 259.927 k.p.h. (161.510 m.p.h.) Rolf Starke, Heinkel HD-38, BMW, 600 HP at Warnemunde, May 7, 1929.

Speed for 500 kil. (Germany) 235.941 k.p.h. (146.606 m.p.h.) Rolf Starke, Heinkel HE 9a, BMW-6, 600 HP, at Warnemunde, May 21, 1929.

Speed for 1,000 kms. (Germany) 222.277 k.p.h. (138.116 m.p.h.) Rolf Starke, Heinkel HE-9, BMW-6, 600 HP, at Warnemunde, May 7, 1929.

Speed for 2,000 kms. (Switzerland) 172.000 k.p.h. (106.875 m.p.h.) Richard Wagner and Geo. Zinsmaier, Dornier, "Merkur" BMW 500-600 HP at Altenrheim, Aug. 10, 1927.

Speed for 5,000 kms. (No Record)

CLASS C2—WITH PAYLOAD OF 1,000 KILOGRAMS (2,204.62 Lbs.)

Returning to Point of Departure

Duration (United States) 17 hrs., 55 min., 13.6 sec. Lts. Zeus Soucek and Lisle J. Maxson, Navy PN-12, 2 Wright R 1,750, 525 HP ea. at Philadelphia, May 25, 1928.

Distance (United States) 2,150 kms. (1,336 mi.) Lt. A. W. Gorton and Chief Boatswain E. E. Reber, U.S.N., PN-12, 2 Pratt & Whitney, 525 HP ea., at Philadelphia, July 11-12, 1928.

**Altitude (Germany) .... 6,389 m. (20,961 ft.) Franz Kneer, Junkers W-34, Bristol Jupiter VII 420 HP, at Dessau, Nov. 7, 1928.

Speed for 100 kms. (Germany) 235.294 k.p.h. (146.204 m.p.h.) Rolfe Starke, Heinkel BMW-6, 600 HP at Warnemunde, May 21, 1929.

Speed for 500 kms. (Germany) 235.941 k.p.h. (146.606 m.p.h.) Rolfe Starke, Heinkel HE-9a, BMW, 600 HP, at Warnemunde, May 7, 1929.

Speed for 1,000 kms. (Germany) 177.279 k.p.h. (110.155 m.p.h.) Richard Wagner, Dornier Superwal, DR-142 4 Gnome-Rhone-Jupiter 480 HP ea., at Frederickshaven-Lindau, Feb. 2, 1928.

Speed for 2,000 kms. (United States) 130.427 k.p.h. (81.043 m.p.h.) Lt. A. W. Gorton and Chief Boatswain, E. E. Reber, U.S.N., PN-12, 2 Pratt & Whitney 525 HP ea., at Philadelphia, July 11-12, 1928.

CLASS C2—WITH PAYLOAD OF 2,000 KILOGRAMS (4,409.24 Lbs.)

Returning to Point of Departure

Duration (United States) .... 16 hrs., 39 min. Lt. A. W. Gorton and Chief Boatswain, E. E. Reber, U.S.N., PN-12, 2 Pratt & Whitney 525 HP ea., at Philadelphia, July 11, 12, 1928.

Distance (United States)..2,150 kms. (1,336 mi.) Lt. A. W. Gorton and Chief Boatswain, E. E. Reber, U.S.N., PN-12, 2 Pratt & Whitney 525 HP ea., at Philadelphia, July 11, 12, 1928.

*Altitude (United States)...5,806 m. (19,065 ft.) Boris Sergievsky, Sikorsky amphibion, landing gear removed, 2 P&W Hornet, 575 HP ea., at North Beach, Queens, N. Y., March 4, 1930.

*Speed for 100 kms. (United States) 231.213 k.p.h. (143.7 m.p.h.) Boris Sergievsky, Sikorsky amphibion, landing gear removed, 2 P&W Hornet, 575 HP. ea., at North Beach, Queens, N. Y., March 13, 1930.

Speed for 100 kms. (Germany) 209.546 k.p.h. (130.105 m.p.h.) Richard Wagner, Dornier Superwal, DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., Fredericks-haften-Lindau, Jan. 20, 1928.

Speed for 500 kms. (Germany) 179.416 k.p.h. (111.483 m.p.h.) Richard Wagner, Dornier Superwal, DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Frederickshaven-Lindau, Feb. 2, 1928.

Speed for 1,000 kms. (Germany) 177.279 k.p.h. (110.155 m.p.h.) Richard Wagner, Dornier Superwal, DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Frederickshaven-Lindau, Feb. 2, 1928.

Speed for 2,000 kms. (United States) 130.427 k.p.h. (81.043 m.p.h.) Lt. A. W. Gorton and Chief Boatswain, E. E. Reber, U.S.N., PN-12, 2 Pratt & Whitney 525 HP. ea., at Philadelphia, July 11, 12, 1928.

Speed for 5,000 kms. (No Record)

CLASS C2—WITH PAYLOAD OF 4,000 KILOGRAMS (8,818 Lbs.)

Returning to Point of Departure

Duration (Germany) ......6 hrs., 1 min., 56 sec. Richard Wagner, Dornier Superwal, DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Frederickshaven-Lindau, Feb. 5, 1928.

Distance (Germany) 1,000.160 kms. (621.468 mi.) Richard Wagner, Dornier Superwal, DR-142 4 Gnome-Rhone-Jupiter 480 HP ea., at Frederickshaven-Lindau, Feb. 5, 1928.

Altitude (Germany) ...... 2,845 m. (9,334 ft.) Richard Wagner. Dornier Superwal, 4 Gnome-Rhone-Jupiter 480 HP. ea., at Friedrichshafen, Lindau, Jan. 23, 1928.

Speed for 100 kms. (Germany) 209.546 k.p.h. (130.105 m.p.h. Richard Wagner, Dornier Superwal, DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Frederickshaven-Lindau, Jan. 20, 1928.

Speed for 500 kms. (Germany) 179.416 k.p.h. (111.483 m.p.h.) Richard Wagner, Dornier Superwal, DR-142 4 Gnome-Rhone-Jupiter 480 HP ea., at Frederickshaven-Lindau, Feb. 2, 1928.

Speed for 1,000 kms. (Germany) 177.279 k.p.h. (110.155 m.p.h.) Richard Wagner, Dornier Superwal, DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Frederickshaven-Lindau, Feb. 2, 1928.

CLASS C2—GREATEST PAYLOAD CARRIED TO AN ALTITUDE OF 2,000 METERS (6,651.7 Ft.)

Germany ....6,450 kgs. (14,220 lbs.) Steindorff, Rohbach "Romar", 3 BMW 500 HP at Travenmunde, Apr. 17, 1929.

**Officially calibrated by the National Aeronautic Association and forwarded to the Federation Aeronautique Internationale for homolgation.*

***At the time of going to press, no official report has been received from the National Aeronautic Association relative to Capt. Boris Sergievsky's altitude flight in a Sikorsky amphibian with a load of* 1,000 *kilograms.*

TECHNICAL

THE PACKARD DIESEL ENGINE

By Capt. L. M. Woolson

Designer of the Packard Diesel

THE Packard Diesel aircraft engine is of the radial air-cooled type having nine cylinders with a bore of 4.812 inches and a stroke of six inches giving a displacement of approximately 980 cubic inches. The engine is rated at 225-horsepower at 1,900 r.p.m. and weighs 510 pounds or 2.26 pounds per rated horsepower.

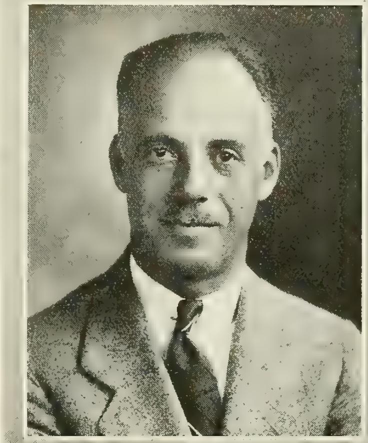
The outside diameter of the engine is slightly over 45 inches, and the engine is attached to the mounting ring with eight ⅜-inch bolts arranged on a bolt circle of 22 inches diameter. So far as its general characteristics are concerned with relation to size, weight and general arrangement, the engine does not differ radically from conventional gasoline aircraft engines of a similar type. This comparison, however, holds good only insofar as general external appearance is concerned, since the engine incorporates many constructional features never before employed in aircraft engines.

The Diesel Principle

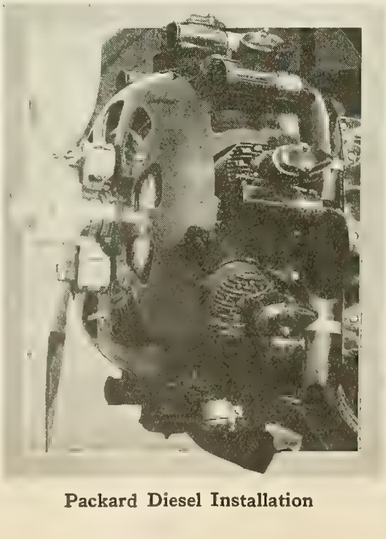
Since the new Packard engine operates on an entirely different principle than the gasoline engines used heretofore in aircraft, it is desirable before launching into a mechanical description of the engine to consider first in a general way the principles of operation of the Diesel cycle as opposed to the Otto cycle principle on which nearly all gasoline engines operate.

The real point of departure between the two systems of operation is the ignition system involved. In the gasoline engine an electric spark is depended upon to fire a combustible mixture of gasoline vapor and air, which mixture ratio must be maintained within fairly narrow limits in order to be fired by this method.

In the Diesel engine pure air is introduced into the cylinders instead of a mixture of air and fuel as in the gasoline engine and this air is compressed into smaller space than is possible using a mixture of gasoline and air which would spontaneously and prematurely detonate if compressed to this degree. The temperature of the air in the cylinder at the end of the compression stroke of a Diesel engine operating with a compression ratio of about 16:1 is approximately 1,000 degrees Fahr. which is far above the spontaneous ignition temperature of the fuel used. Accordingly, when the fuel is injected in a highly atomized condition at some time previous to the piston's reaching the end of its stroke, the fuel burns as it comes in contact with the highly heated air and the greatly increased pressures resulting from the tremendous increase in temperature brought about by this combustion, acting on the piston, drive the engine as in the case of the gasoline engine.



Summing up, then, the differences between the Diesel and gasoline engines, start with the fact that the gasoline engine requires an electrical ignition system in order to fire the combustible mixture whereas the Diesel engine generates its own heat to start combustion by means of highly compressed air. This brings about the necessity for injecting the fuel in a well atomized condition at the time that combustion is desired and the quantities of fuel injected at this time control the amount of heat generated; that is to say, an infinitesimally small amount of fuel will be burned just as efficiently in the Diesel engine as a full charge of fuel, whereas in the gasoline engine the mixture ratio must be kept reasonably constant and if the supply of fuel is to be cut down for throttling purposes the supply of air must be correspondingly reduced. It is this requirement in a gasoline engine that necessitates an accurate and sensitive fuel and air metering device known as the carburetor.



Packard Diesel Installation

The fact that the air supply of a Diesel engine is compressed and its temperature raised to such a high degree permits the use of liquid fuels with a high ignition temperature, and it is these fuels which correspond more nearly to the crude petroleum oil as it issues from the wells. This fact accounts for the low cost of the Diesel fuel.

General Design Features

A review of the design will show that weight economies have been secured by a simplification of design.

The crankcase, which weighs only 34 pounds, is unique not only because it is of one piece thus dispensing with heavy flanges and bolts, but also because of the novel fashion in which the cylinders are fastened to the crankcase. Two circular hoops of alloy steel encircle the cylinder flanges in contact with the crankcase at the front and rear of the engine, and these hoops are contracted by means of turnbuckles so that an initial stress is set up in these hoops which exceeds by a wide margin the operating stress resulting from the cylinder explosions. When the engine is running these stresses are materially reduced and at no time is it possible to transfer any tension loads from the cylinder to the crankcase.

In the Packard Diesel engine the maximum cylinder pressures are more than ten times greater than the average cylinder pressures during the working stroke and this would necessitate the pistons, connecting rods, crankshaft and propeller being approximately ten times as strong as they would have to be to resist the average pressure were it not for the fact that effective measures have been taken to cushion these major parts of the engine from the shock-loading resulting from the high explosion pressures. Advantage is taken of the fact that these peak explosion pressures exist for a very short time in each cycle. The crankshaft counterweights and the propeller are both flexibly mounted on the crankshaft so that when the peak pressures occur a cushion is interposed between the crankshaft and those parts which have the maximum inertia or flywheel effect. In this manner the stresses in the crankshaft are reduced and it is possible to use a crankshaft of a size not substantially different than that employed in a corresponding gasoline engine of the conventional type.

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To describe the cushioning methods in detail—the counterweights, instead of being rigidly bolted to the crank cheeks, are pivoted on them and are located between powerful compression springs. With this arrangement when the crankshaft is suddenly accelerated, the counterweights lag behind slightly so that the peak cylinder pressure is expended before the counterweights are again solidly driven by the crankshaft. In a similar fashion, the propeller hub, instead of being splined or keyed to the crankshaft, is allowed to float on an extension of the crankshaft driving-end, and specially designed propeller-blade clamp-rings provided with integral driving lugs receive the driving effort from a two-armed driving member splined to the crankshaft. On the extremity of each of these two arms a pair of rubber blocks are compressed, between which the propeller clamp ring driving lug is secured. These rubber blocks are confined in such a manner as to yield the desired elasticity.

Before giving a detailed description of the engine it might be desirable to discuss briefly the special features of the cylinder design which have resulted in a very light construction, each cylinder weighing only 11¾ pounds. The cooling problem of a Diesel cylinder was considerably simpler than that of a corresponding gasoline engine cylinder since the increased thermal efficiency of the Diesel is reflected in lower heat losses to the cylinder walls than is the case with the gasoline engine cylinder. This fact justified a simple form of closed end cylinder design in which the cylinder head proper is formed integral with the cylinder barrel.

The fact that only pure air is drawn into the cylinder on the intake stroke of the Diesel permits the use of a single valve for both inlet and exhaust purposes. Bolted to the top of each cylinder is a light aluminum cylinder head carrying cooling fins and supporting the valve operating mechanism as well as forming the combined inlet and exhaust port.

One of the main distinctions between a Diesel engine and a gasoline engine is the manner of insuring a homogeneous mixture of fuel and air. It is obvious that in either case such a mixture must be created if perfect combustion is to be secured in the extremely short space of time available, amounting to about four-thousandths of a second at an engine speed of 1,800 revolutions per minute.

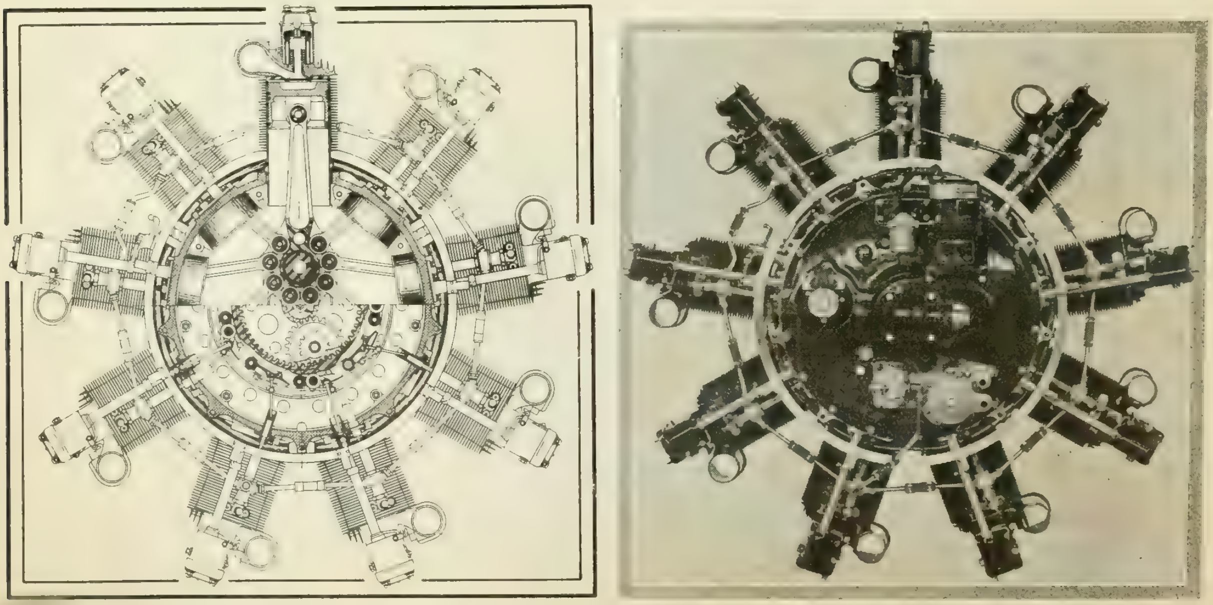
In a gasoline engine this mixing of fuel and air is accomplished in the carburetor, intake manifold, rotary distributor (if used) and finally in the cylinder itself during the intake and compression stroke. In the Diesel engine no fuel is admitted into the cylinder until practically the instant that combustion is desired. It is obvious, therefore, that in a high speed Diesel special means must be provided to insure efficient combustion. In the Packard engine this has been accomplished by giving the incoming air an extremely rapid whirling motion. Practically all of the oxygen comes in contact with some part of the fuel spray, thus insuring complete combustion, but such satisfactory results could not be obtained were it not for a finely atomized injection of the fuel, accurately controlled and timed.

The feature which probably contributed most to this phase of operation is the combination fuel pump and nozzle unit. Heretofore the majority of solid fuel injection engines of the so-called high speed type (maximum revolutions about 1,200 r.p.m.) have been characterized by a multiple pump unit mounted somewhere on the engine remote from the cylinder heads in which the nozzles are located and connected to them by comparatively long capillary tubing. With such a system satisfactory high speed operation is difficult to obtain for several reasons, the principal one being that enormous hydraulic pressures necessary for high speed operation cause serious surges of pressure waves in the tubing which interfere with the correct timing of the fuel injection and also tend to make the engine run unevenly, since it is difficult to arrange the tubing to the various cylinders all of the same length. Another difficulty arises from the trapping of air in the capillary tubing, which air is difficult to expel and causes the engine to misfire. These troubles have been overcome with the Packard fuel injection system since the pump and nozzle are practically one unit with short connecting passages between them.

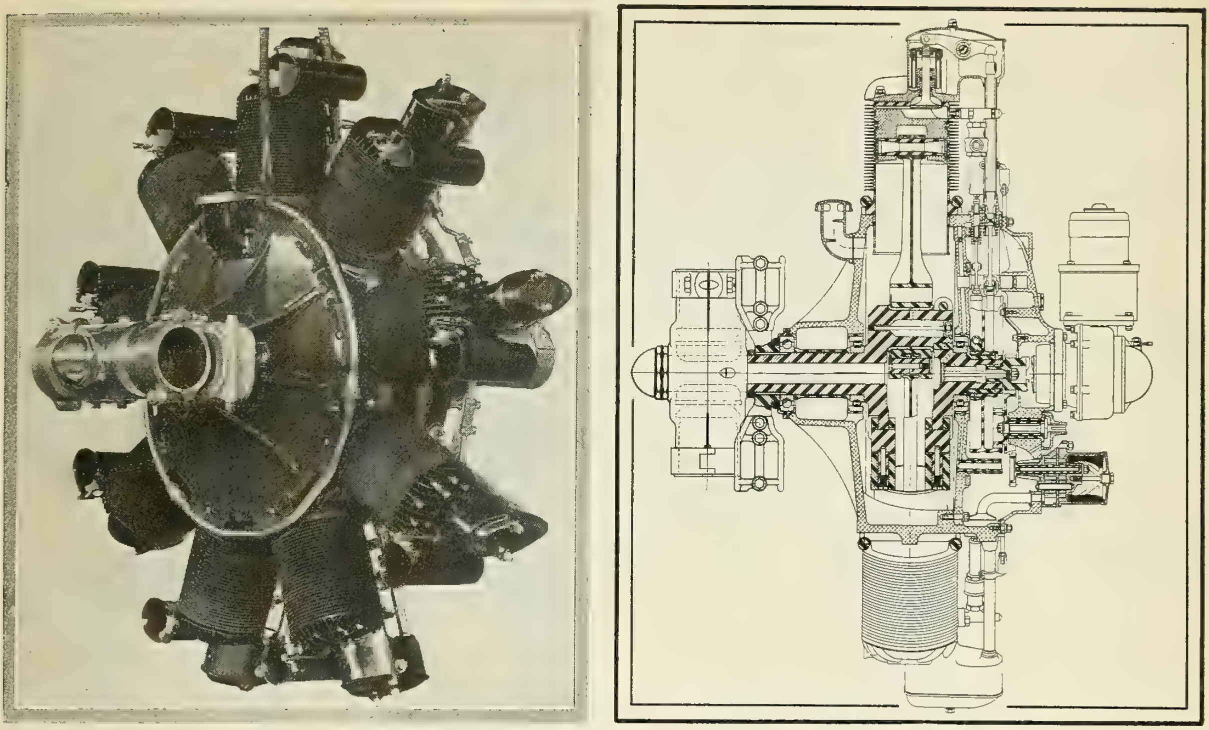
The crankcase of the Packard Diesel is a one-piece magnesium alloy casting of rather large diameter, this casting supporting, through the medium of a forged steel container, a deep groove ball bearing at the front end adapted to take both propeller thrust and radial load at this point. A roller bearing is mounted immediately ahead of the front crankshaft cheek, this bearing arrangement being quite orthodox.

The crankshaft is of the commonly used split type, the rear half of the crankshaft being attached to the front half by means of a clamp bolt and key engaging the crankpin. The rear crankshaft bearing is also of the roller bearing type and is supported in a removable wall in the crankcase termed the diaphragm. This diaphragm is immediately in line with the rear cylinder retaining hoop just as the front crankcase integral wall is immediately in line with the front cylinder retaining hoop. In this manner these two walls receive the full compression of the retaining hoops, a close fit being maintained between the outside diameter of the diaphragm and the bored opening in the crankcase.

The rear end of the crankcase is closed by a cover casting which carries the oil and fuel circulating pumps, starter, generator



Transverse section and exterior views of the 225-horsepower Packard Diesel engine from the rear



Propeller end of the Packard Diesel and longitudinal section showing internal details

and tachometer drives.

The connecting rod assembly follows standard practice in practically every respect, a master connecting rod being used in conjunction with eight link connecting rods of conventional design.

The valve and fuel pump push rods, of which there are nine each, all radially arranged at the rear of the engine, are in turn operated by two cams which are formed integrally and each of which is provided with four lobes. These cams are driven at one-eighth engine speed in the direction opposite to the crankshaft rotation, a large internal gear being formed integrally with the cams and a compound idler gear meshing with the cam and crankshaft gears respectively. Both the single valve and fuel pump of each cylinder are operated through the medium of rocker arms which contact with the respective cams and are supported on a common shaft which is anchored in the diaphragm and also obtains a steady bearing in suitable bosses formed in the cover casting. The pair of rocker arms for each cylinder is located endwise between an integral shoulder on the shaft at the inner end and a shouldered bushing held in place by a cap screw at the outer end. Both the fuel pump and valve rocker arms contact with short ball-ended push rods, the outer ends of which contact with plungers fitted in forged duralumin guides which are radially arranged and bolted to finished surfaces on the outside of the crankcase.

Whereas the inner end of the air valve push rod seats in a spherical receptacle formed in the rocker arm referred to, the inner end of the fuel pump operating push rod fits in a specially formed groove or channel provided in the fuel rocker arm. Furthermore, these fuel pump push rods are connected by linkage near their inner ends to a circular control ring mounted in a groove on the diaphragm, the movement of which ring is controlled by an externally mounted lever connected to the pilot's control and offering the sole means of regulating the speed of the engine. The linkage referred to moves the inner end of the fuel push rods in the rocker arm groove whereas the outer end of the push rod is held in contact with the plunger. In the outer end of the plunger a tappet screw with lock nut is fitted, this tappet screw contacting directly with the fuel pump operating plunger. It will be understood that the movement of the inner end of the push rod alters the effective stroke of the fuel pump plunger, thus varying the amount of fuel injected into the cylinders in accordance with requirements.

The lubricating oil pump is mounted on the crankcase cover and driven by a spur gear off of the cam idler gear.

The crankcase cover is provided with additional flanges conforming to standard S. A. E. generator, engine starter and fuel pump mountings and a standard form of tachometer drive is provided.

The cylinder heads are light aluminum alloy castings which serve merely to support the overhead valve mechanism and valve stem guide and incorporate the inlet and exhaust ports.

The valve operating mechanism outside of the crankcase consists of a ball-end push rod engaging a rocker arm of conventional design which is mounted on a roller bearing which in turn oscillates on an eccentrically arranged shaft. This shaft is supported in bosses on the cylinder head and is locked in place by a castellated nut.

Each valve is fitted with twelve valve springs of the multiple type used on previous models of Packard aircraft engines, and as an additional precaution, a small wire circlip engages the valve stem above the valve guide and prevents the valve from dropping into the cylinder from any cause.

An aluminum alloy piston is used characterized by a peculiarly shaped head provided with an eccentrically located pocket which is designed to promote, in conjunction with the inlet port and valve arrangement, a high degree of turbulence which is so largely responsible for the efficient operation of this engine at high speed.

A piston pin of conventional construction is used and it is allowed to float in both the piston bosses and the connecting rod small end bearing. Aluminum plugs are expanded into each end of the piston pin.

The fuel pump and nozzle assembly constitutes a readily detachable and interchangeable unit which is bolted to a flange on the rear of the cylinder by means of two cap screws. Fuel at low pressure is supplied to the screen housing and the pump plunger is operated by the adjustable tappet referred to previously. Aside from these external connections the entire pump and nozzle represents a self-contained unit.

The fuel pump body consists of an alloy steel forging machined all over and fitted with a bronze cylinder which is pressed in place, after which the cylinder bore is finished by special equipment and methods which have been developed to secure the extreme accuracy and high finish which are essential to this cylinder bore. The pump plunger is formed of heat-treated steel and

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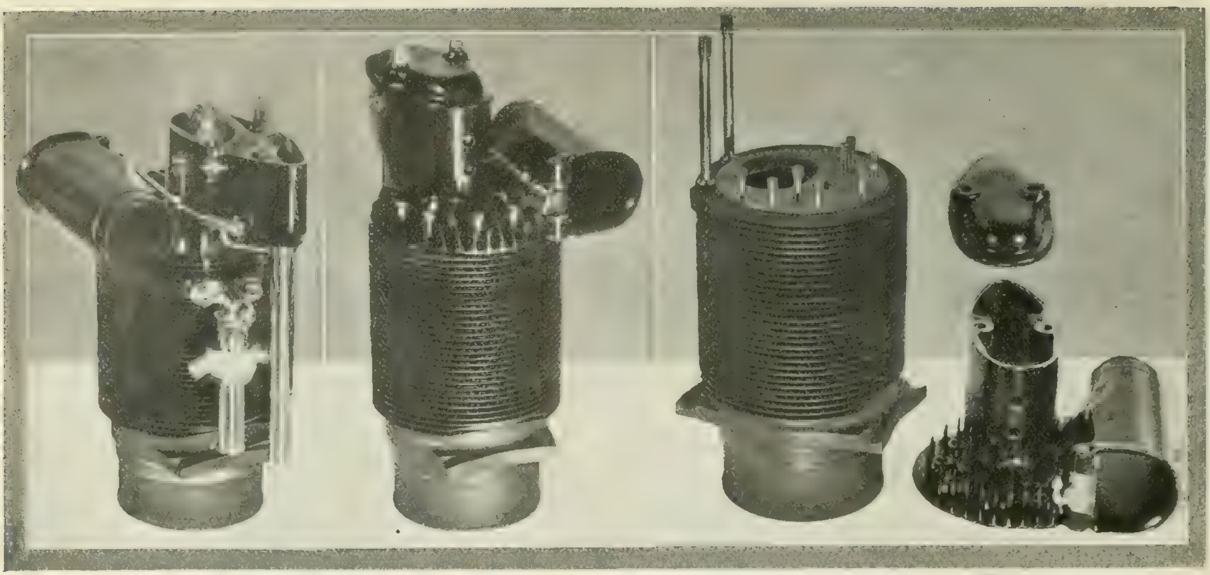

Front and rear views of Packard Diesel cylinder units and their sub-assemblies

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provided with a mushroom head which engages a T-slot in a cross head or guide which contacts in turn with the fuel pump tappet. A compression spring surrounds the fuel pump cylinder and returns the pump plunger at the conclusion of its working stroke. Ports are provided in the fuel pump cylinder through which the fuel enters after passing through a fine mesh screen of such generous area that cleaning is not required for several hundred hours of operation. Clamped between the fuel pump body and the nozzle body is a ball check valve assembly which permits the fuel to flow to the nozzle and prevents any gases from the combustion chamber backing up into the fuel pump cylinder.

The nozzle body is formed with an integral two-bolt flange which constitutes the means of attachment to the engine cylinder. The nozzle assembly itself is an independent unit which is screwed into the nozzle body and consists of a flared end nozzle into which is seated a small poppet valve fitted with a compression spring arranged to hold the valve seated, not against the nozzle, but against an independent adjustable screw stop situated at the rear end of the nozzle body. This nozzle valve is adjusted to be off of its seat a few thousandths of an inch, an arrangement which insures atomization for starting and freedom from carbon-forming propensities.

Each cylinder head is provided with a shutter valve operated for a fore and aft connecting rod which in turn is connected by a ball joint to the air valve push rod tube. These tubes are fitted with ball-jointed levers at their inner ends engaging sockets which are riveted to a control ring supported from the crankcase mounting bosses. This control ring is operated by means of a cam in conjunction with the throttle so that for idling purposes the front ports of the cylinder head are substantially closed and all air is drawn back through the exhaust manifold.

Though this system is not essential to the operation of the engine, it has been found that better idling is secured in this fashion, it being possible to run the engine steadily at speeds as low as 250 r.p.m.

One of the major problems in connection with the development of this Diesel aircraft engine has been the matter of starting. It was finally concluded that the conventional type of inertia starter used so successfully with gasoline aircraft engines offered the best solution.

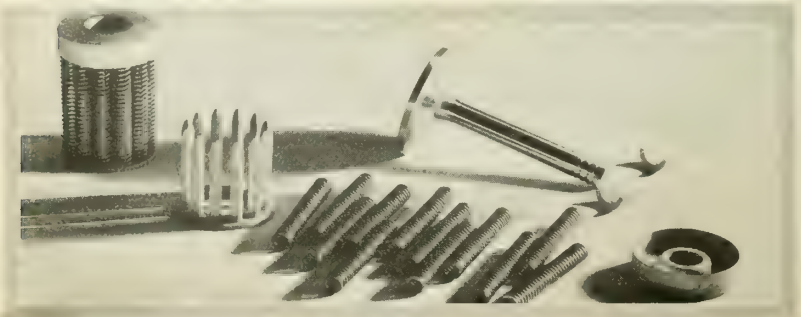
It was found necessary to develop an incandescent heating element or glow plug to give the required heat. These glow plugs are not required except at low temperatures but their presence in the engine offers no handicap to its ordinary operation and these plugs will therefore normally be fitted to the engine, although in special cases they may be omitted and their place taken by blind plugs. With these glow plugs instantaneous starts are possible at any temperature at which it is possible to turn the engine over at all.

In general, the lubrication system does not differ radically from conventional practice. There are no oil pipes inside the engine nor are there any drilled passages in the crankcase itself. The system operates on the dry sump principle with an external oil tank in close proximity to the engine. A pipe leads from the bottom of this tank to a connection on the oil pump housing, whence it flows through a generous size screen which is readily accessible for cleaning purposes. The oil then enters the pressure pump, and from there it is forced through the main connection to the engine, with a pressure relief valve adjusted to about 60 pounds per square inch returning the excess oil to the tank.

The rear crankshaft cheek is drilled in line with a hole in the crankpin communicating with the interior thereof which is bored out for lightness and to act as an oil reservoir. A hole is drilled in the crankpin for lubricating the connecting rod bearing which is formed of two flanged bushings mounted end to end with a small space between them. Oil flows through this space into slots machined in the master connecting rod big end bore and thence through small holes drilled at an angle to bring oil under pressure to the link rod pin bushings.

Both crank cheeks are also drilled to provide oil passages to the counterweight pin bushings.

Returning now to a consideration of the diaphragm oil passages—the main radial feed hole which supplies oil to the oil ring referred to is extended to meet a groove surrounding the rear roller bearing liner. This circular groove distributes oil through eight other radially drilled passages to each of the hollow rocker arm shafts. These shafts in

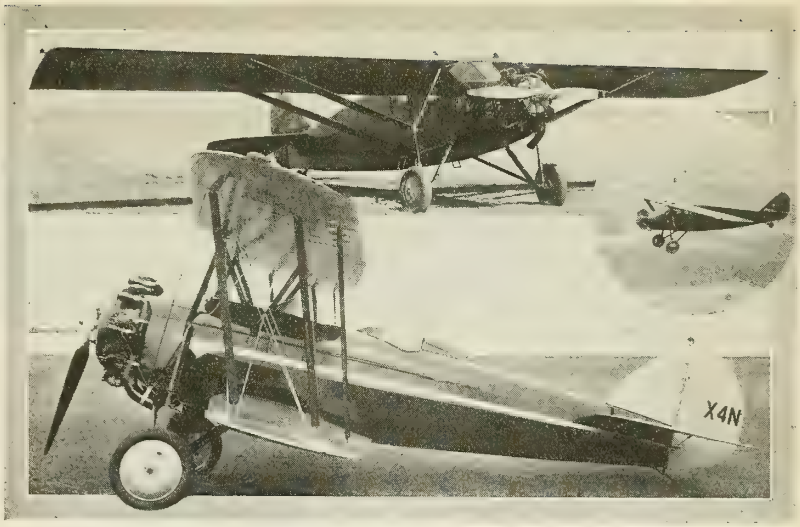


Springs, guides and cap used with the Packard Diesel valve mechanism turn are drilled radially with small holes to provide pressure lubrication for both the fuel and valve rocker arms.

Operation of the Engine

The operation of the engine is as follows:

Starting with a consideration of the intake stroke—it will be found that the single valve has been open during the exhaust stroke and remains open as the piston travels down from top dead center drawing fresh air through the intake port which is exposed to the slipstream of the propeller. Shortly after bottom dead center the valve closes and the air in the cylinder is compressed on the up-stroke of the piston. A compression ratio of about 16:1 being used, the air is compressed to a pressure of about 500 pounds per square inch and its temperature is thereby raised to about 1,000 degrees Fahr. About 45 degrees before top dead center the fuel pump tappet starts to rise forcing the pump plunger upward. As soon as the pump plunger has passed the inlet port of the fuel pump, the fuel which is trapped in the fuel pump cylinder is compressed and forced out through the nozzle in a finely atomized spray which immediately ignites on coming in contact with the superheated air in the cylinder. The amount of fuel injected depends upon the length of the stroke of the fuel pump plunger above the "cut-off" position, that is, the point at which the inlet port to the fuel pump is covered by the plunger. The amount of stroke above this cut-off position is determined by the position of the fuel pump push rod in the groove formed in the fuel pump rocker arm, which depends upon the position of the control ring carrying the small connecting rods which are attached to the push rods. This control ring is rotated through a small arc by means of a tapered roller engaging in a slotted yoke which is riveted to the control ring. The tapered roller is mounted on a short lever which is splined to the control shaft and this shaft is journaled in the crankcase and carries on its outer end a lever also splined to the shaft to which the pilot's throttle control is connected.



Packard Diesel engines as installed in Waco and Stinson planes

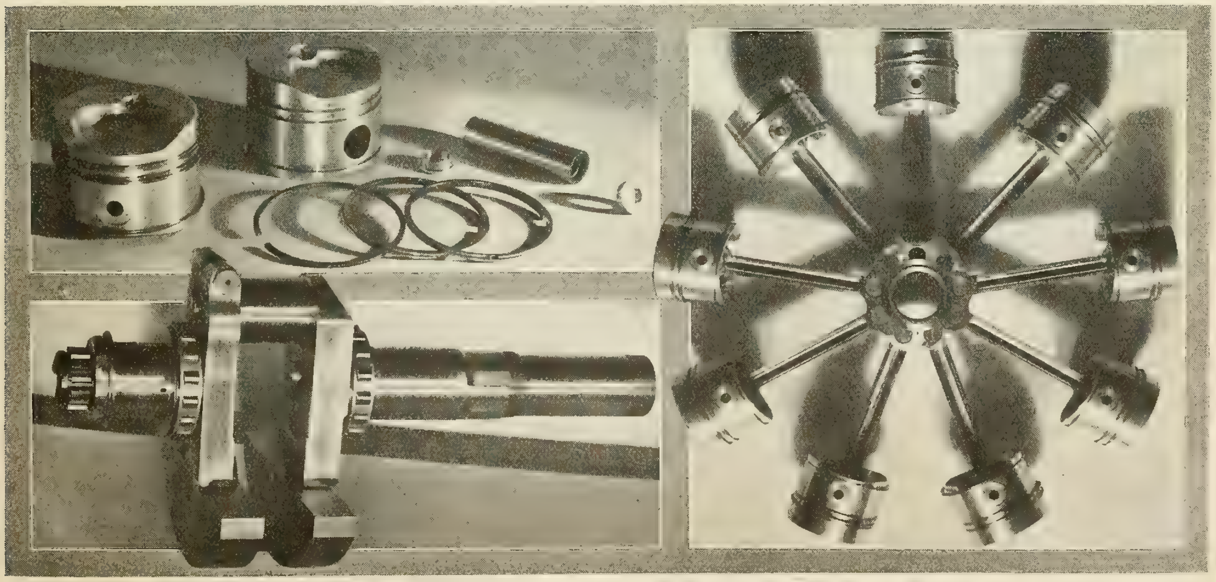
As aforesaid, the fuel injection starts about 45 degrees before top dead center and continues until the piston is almost at top dead center, thus allowing the pressure to rise in the cylinder at a comparatively slow rate until a maximum pressure of about 1,200 pounds per square inch at wide-open throttle is reached. When the piston passes top dead center the gases expand in the cylinder until the single valve opens approximately 45 degrees before the piston reaches bottom dead center. The products of combustion are then forced out through the valve and through the exhaust manifold which is connected to the rear opening of the combined inlet and exhaust port on the cylinder head. The valve remains open throughout the exhaust stroke and, of course, continues open while the piston is on the intake stroke which immediately follows.

The operation of the engine is exactly the same regardless of how much fuel is being introduced into the cylinders except that for very slow idling the fresh air ports are almost closed by the shutters.

The engine is started by means of the familiar type inertia starter used commonly with all types of gasoline aircraft engines.

In stopping the engine it is merely necessary to close the throttle completely against a spring stop, this extra motion of the throttle mechanism serving to restrict the stroke of the fuel pumps until the pump plunger barely rides higher than the pump inlet port and consequently forces no fuel into the nozzle. Incidentally, the engine can be stopped instantly no matter how hot it may be since there is never any danger of the engine kicking backwards. It is therefore never necessary to shut the fuel off when stopping.

The fuel generally used is domestic furnace oil costing about nine cents a gallon.



Pistons, crankshaft unit and assembly of piston rods in the Packard Diesel

PITCAIRN PA-7 MAILWING

THE most recent model of the Pitcairn Mailwing, designated as the PA-7, differs little in essentials from the preceding PA-5 and PA-6 models, but has been refined aerodynamically and structurally to improve performance and to reduce servicing requirements.

Powered with the Wright J-6 seven-cylinder 225-horsepower engine, the ship provides a speed range-ratio of three to one, despite a high safety factor and ruggedness of construction. With a full load, it has a high speed of 150 miles per hour, which can be increased by the addition of an N.A.C.A. cowling, and a landing speed of 54 miles per hour. The payload of the new machine has been approved by the Department of Commerce at 636 pounds.

The machine is built in two forms, one of which, the Sport Mailwing, is a high performance sport and business plane. This ship is structurally identical with the Mailwing. Since sportsmen often are compelled to fly over rough country in search of new fishing and hunting grounds, this plane has been designed to permit operation in and out of small fields, and the loading requirements permit the taking of duffel for extended trips.

The aerodynamic improvements consist of new wing tips of rounded form which decrease tip vortices and the eddies inducing drag, new ailerons with a shielded balance for their differential action, and retraction of the landing lights.

The machine was designed to combine high cruising speed, wide speed range, a rapid rate of climb, economical operation, and reliability in the event of forced landings on small intermediate fields.

The Mailwing carries its authorized payload in a metal lined compartment of large cubic capacity, readily accessible from both sides of the fuselage through spring doors on top.

The welded steel fuselage of the machine is of normal Warren truss design, its chief characteristic being the use of square tubing for longerons and front structural members. This material is approximately one inch square in section, with rounded corners. According to the Pitcairn company, it has the advantage of simplifying the process of welding, thus facilitating a uniform strength of welds. No wires are used in the fuselage structure, all bracing members being made of steel tubing and steel tension rods.

The fuselage is faired over the top and sides with metal U strips, similar to the familiar trailing edge strips. Covering is of fabric, except over the mail compartment and engine, which are covered with detachable aluminum cowlings.

A sixty-three-gallon fuel tank is fitted immediately aft of the fire-proof bulkhead in the fuselage, and cradled between the upper longerons. This tank is a welded structure of heavy aluminum. Its location is such as to cause only a slight change in the center of gravity as it is emptied. The fuel is fed entirely by gravity.

The disposition of the mail or express load, concentrated between the weight of the engine and the pilot, is such that the movement of the C.G. position is little more than one inch, regardless of the payload carried.

The arrangement of biplane wings, which are positively staggered twenty-two inches, allows good visibility for the pilot, whose cockpit is well behind the trailing edge of the lower wing. The wide spacing of the cabane struts is also another factor in bettering the visibility for the pilot. Also the pilot may raise himself several inches by means of the adjustment of the pilot's seat.

The wing structure, of conventional type, consists of four single-bay panels and a center section, which is of unusual width to increase the strength of the cellule and provide easier access to the mail compartment. The upper wings are set at a dihedral of one degree, and the lower wings have a dihedral angle of four degrees.

The wings are completely bonded throughout. All metal fittings are joined with copper stripping, which permits use of radio equipment and reduces the risk of fire through discharge of atmospheric electricity.

The tail group is a welded structure of steel tubing, the stabilizer being adjustable, through a worm mechanism, from the cockpit.

The wide-tread split axle landing gear is fitted with pneumatic shock struts. These struts extend directly from the axles at

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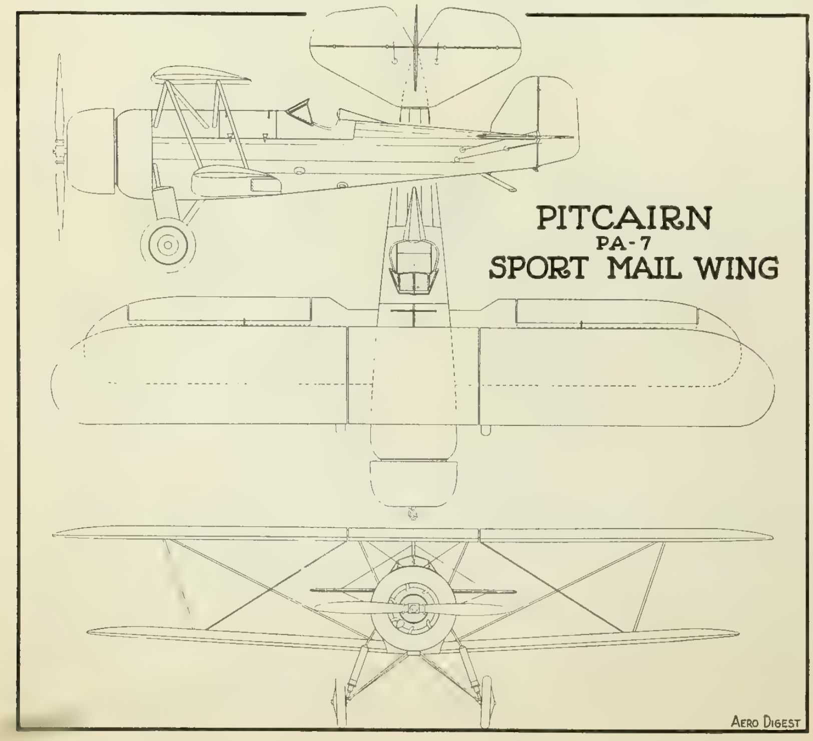
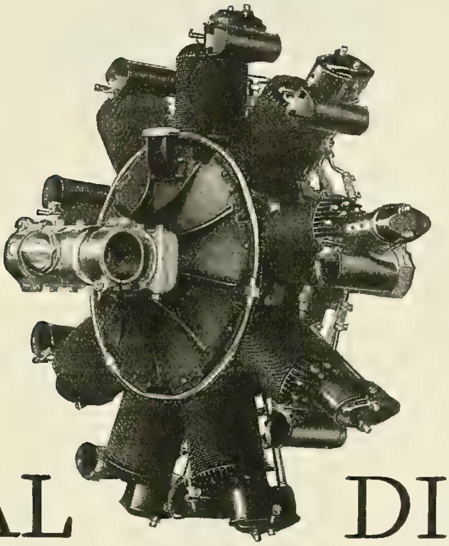


PACKARD



RADIAL DIESEL AIRCRAFT ENGINE

PACKARD—the "Master Motor Builders"—announces the first public showing of the Packard-Diesel Aircraft Engine at the All-American Aircraft Show, Detroit, April 5–13.

This revolutionary new engine will be exhibited by Packard in spaces 13–15, Hoover Airway. Several leading aircraft manufacturers will also exhibit planes on which the Packard-Diesel is standard equipment.

The Packard-Diesel Aircraft Engine has successfully met the Department of Commerce requirements for an approved type certificate and has been officially rated at 225 H. P. It is now in quantity production and will soon be seen on planes at many flying fields. In view of this, arrangements are rapidly being perfected to provide fuel at all airports.*

You are cordially invited to inspect the Packard-Diesel Aircraft Engine—see how easily it starts, how quickly it warms up, how smoothly it operates at all speeds. Flight demonstrations in Packard-owned planes will be available to interested aircraft manufacturers during the week of the Show at the Detroit City Airport.

PACKARD MOTOR CAR COMPANY
DETROIT, MICHIGAN

The Texas Company has already arranged fuel supply throughout their international distributing system in the U. S., Canada and Mexico.

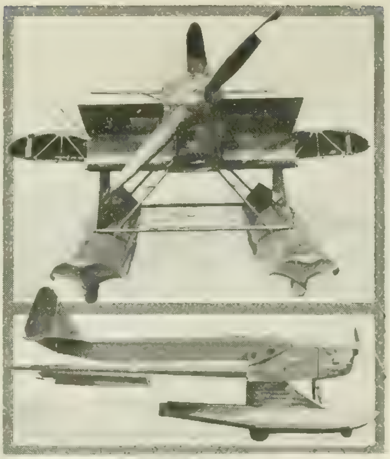
UPPERCU-BURNELLI Amphibion with Inverted engine

EXCELLENT performance has resulted from the use of the American Cirrus inverted 90-horsepower engine in the Aeromarine-Klemm type amphibion developed by the Uppercu-Burnelli Aircraft Corporation. This machine is in itself a radical departure from current amphibion practice in that its wheels retract into the floats, after the invention of Vincent J. Burnelli.

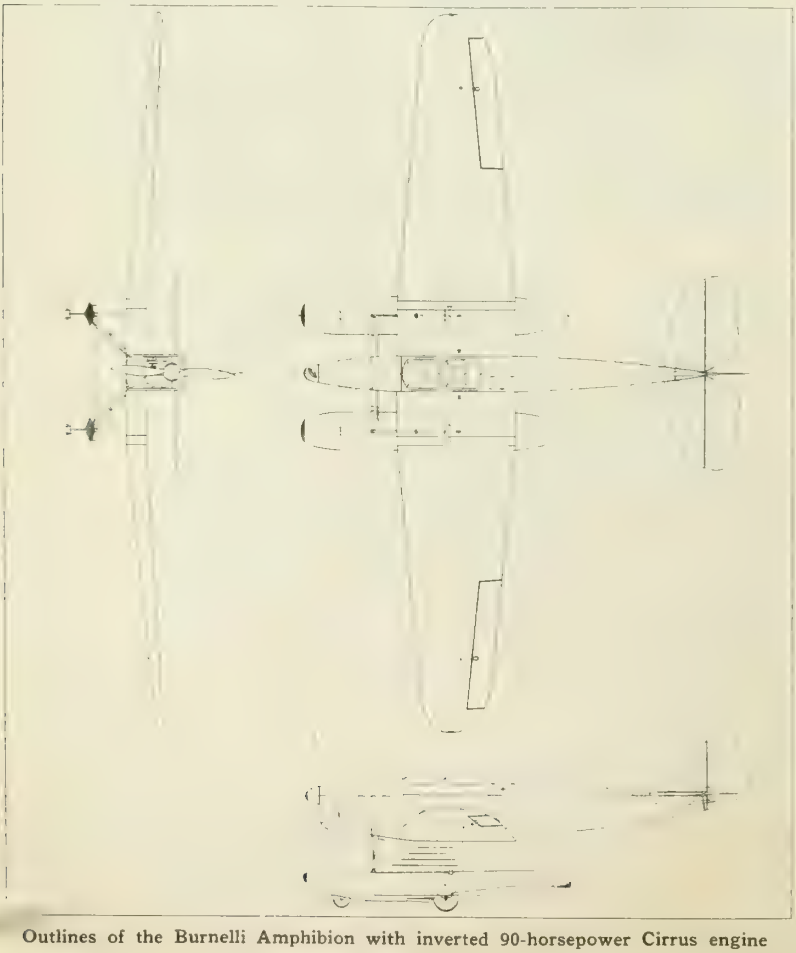
Two views of this ship are featured on the cover of this issue of AERO DIGEST.

The arrangement of the floats with their Airwheels was worked out by Harold D. Kantner, who is in charge of the float department of the corporation. The amphibion has been given more than fifty hours flying. It was first flown with a LeBlond 90-horsepower engine, and with this installation, attained a speed of approximately 100 miles per hour. A description of the ship so powered appeared in the February issue of AERO DIGEST. The reduction of head resistance and other features has increased this high speed, which is now between 107 and 110 miles per hour.

This is the first time that the Cirrus inverted engine has been given extended flight tests in a plane of this type. It is claimed that this is the first inverted Cirrus engine to take to the air.



New Burnelli Amphibion with wings in folded position for storage



Outlines of the Burnelli Amphibion with inverted 90-horsepower Cirrus engine

Specifications

Wing span	40 feet 2 inches
Chord, maximum (at body)	79 inches
Length overall	24 feet 10 inches
Span of tail surfaces	11 feet
Weight empty	1,440 pounds
Disposable load	500 pounds
Gross weight	1,940 pounds
Wing area	210 square feet
Aileron area	18.3 square feet
Stabilizer area	19.5 square feet
Elevator area	13.6 square feet
Fin area	3.8 square feet
Rudder area	7.0 square feet
Gas capacity	30 gallons
Oil capacity	2 gallons
Radius of operation	450 miles
Propeller diameter	86.5 inches

Performance

High speed	107-110 miles per hour
Low speed	45 miles per hour
Cruising speed	85 miles per hour
Time required for water take-off	16 seconds
Time required for land take-off	12 seconds

PITCAIRN MAILWING

(Continued from preceding page)

points near the wheels to the apex of a triangular structure which distributes the stresses through the fuselage. Sauzedde brakes are fitted to the wheels and are controlled individually.

The engine is equipped with an adjustable-pitch metal propeller and air-cleaner. Gases from the exhaust collector ring are discharged at a point below the fuselage well to the rear.

The retractable landing lights provide a beam straight down, straight ahead and at every intermediate angle. They are controlled individually from the cockpit. The principal instruments for navigation and night flying are standard equipment. Two altimeters are provided, and the normal bank-and-turn indicator is supplemented by a ball bank indicator. The flight instruments, which form a cross before the pilot's eyes, are indirectly lighted, and a small button on the control stick lights up the entire board. The flight instrument lights are controlled through an adjustable rheostat. The instrument arrangement is a patented feature of the ship.

In the Sport Mailwing dual controls and flight instruments are provided in the forward cockpit, which is adequately large for two persons.

Specifications

Span, upper	33 feet
Span, lower	30 feet 3½ inches
Length overall	23 feet 9 inches
Height overall	9 feet 6½ inches
Wing area	243½ square feet
Gap at fuselage	62 inches
Stagger	22 inches
Weight empty	1,820 pounds
Total weight	3,050 pounds
Wing loading	12.5 lbs. per sq. ft.
Power loading (at 225 h. p.)	13.55 lbs. per h.p.
Gasoline capacity	63 gallons
Oil capacity	6 gallons
High speed (sea level)	150 miles per hour
Landing speed	54 miles per hour

Pick Your Ship

From these Remarkable Used Plane Bargains

Every ship licensed for passenger carrying—every ship inspected, put in good flying condition and certified by Curtiss-Wright. Many of these are pink-of-condition "demonstrators." Your choice on easy payment terms. For prompt and complete cooperation, wire or write without delay to Curtiss-Wright Flying Service bases listed below, or to 27 West 57th Street, New York.

CURTISS-WRIGHT

For Your Protection:

1. Accepts in trade only *licensed* aircraft and engines.
2. Sells used equipment only when it is *airworthy*.
3. Examines every used plane and engine —gives you a *complete* and *accurate* report on its condition.
4. Issues an inspection certificate with every sale.

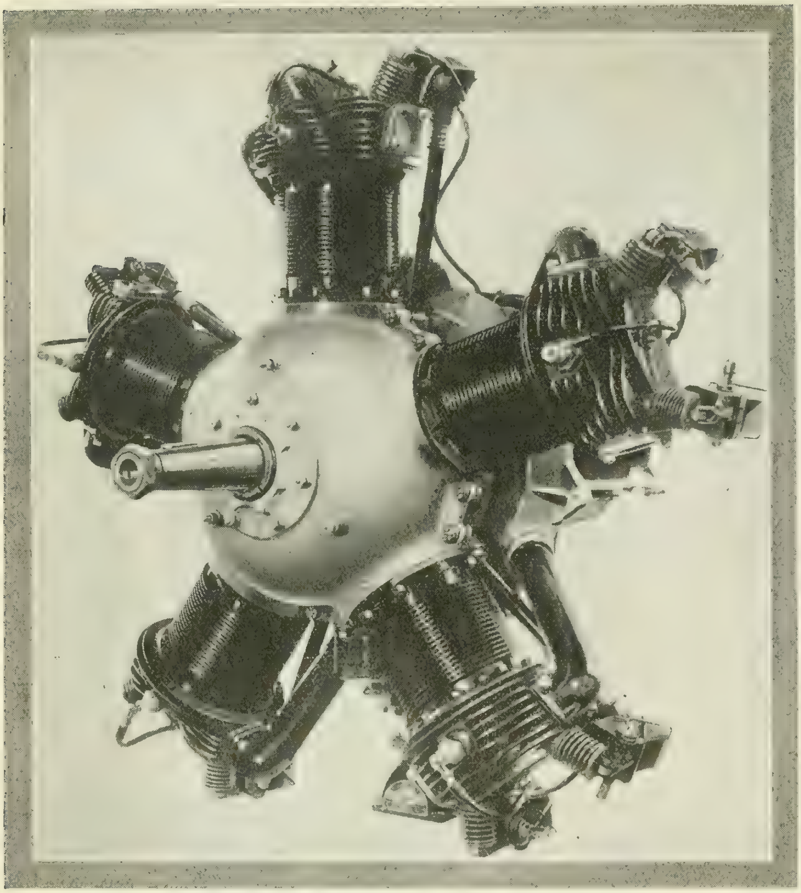
MAKE	TYPE	ENGINE	DC No.	HOURS	PRICE	BASE
Cessna	4 pl. Cabin	300 Whirlwind	NC-301-M	15	$7,850	Miami
Cessna	4 pl. Cabin	225 Whirlwind	C-9863-M	37	5,675	Memphis
Cessna	4 pl. Cabin	225 Whirlwind	NC-631-K	9	5,805	Columbus
Cessna	4 pl. Cabin	300 Whirlwind	NC-638-K	4	7,980	Dallas
Cessna	4 pl. Cabin	Warner	C-9852	107	3,515	Columbus
Cessna	4 pl. Cabin	Warner	NC-8144	30	3,900	Valley Stream
Cessna	4 pl. Cabin	Warner	C-8784	59	3,755	Los Angeles
Cessna	4 pl. Cabin	Warner	C-8795	94	3,580	Chicago
Cessna	4 pl. Cabin	Warner	C-8792	96	3,540	Oklahoma City
Cessna	4 pl. Cabin	Warner	C-8145	87	3,615	Raleigh
Cessna	4 pl. Cabin	Warner	NC-8148	60	3,750	Boston
Cessna	4 pl. Cabin	Warner	C-8791	25	3,925	Miami
Cessna	4 pl. Cabin	Warner	C-9858	110	3,485	Memphis
Cessna	4 pl. Cabin	Warner	C-8785	33	3,885	Columbus
Cessna	4 pl. Cabin	Warner	C-8143	59	3,755	Kansas City
Cessna	4 pl. Cabin	300 Whirlwind	NC-6449	8	7,920	Toledo
Cessna	4 pl. Cabin	225 Whirlwind	NC-644-K	9	5,805	Toledo
Cessna	4 pl. Cabin	Warner	NC-9093	108	3,495	Valley Stream
Cessna	4 pl. Cabin	Warner	NC-9094	117	3,465	Valley Stream
Cessna	4 pl. Cabin	Warner	C-9859	20	3,950	Cleveland
Cessna	4 pl. Cabin	Warner	C-8788	57	3,765	Indianapolis
Waco	3 pl. Open Bi	OX-5	NC-9506	70	1,500	Louisville
Waco	3 pl. Open Bi	OX-5	NC-5183	80	1,500	Camden
Travel Air	3 pl. Open Bi	Hisso	C-6149	128	2,300	Baltimore
Travel Air	3 pl. Open Bi	OXX-6	NC-6012	140	2,100	Hartford
Travel Air	3 pl. Open Bi	OX-5	NC-1142	200	1,000	Bridgeport
Travel Air	3 pl. Open Bi	Hisso	NC-6037	108	1,800	Louisville
Travel Air	3 pl. Open Bi	Millerized OX	NC-4851	314	1,500	Moline
Travel Air	3 pl. Open Bi	OX-5	NC-4427		1,500	Boston
Sparton	3 pl. Open Bi	Minus Eng.	NC-6577	140	1,750	Detroit
Stinson	4 pl. Cabin Bi	Wright J-5	NC-2779	400	4,000	Hartford
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-5458	32	4,000	Portland
Fairchild	Photo Mono	Challenger	NC-32	652	3,000	Bridgeport
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-4440	328	3,900	Louisville
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3569	206	3,500	Valley Stream
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3315	108 (Eng.)	4,000	Boston
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3569	9 (overhauled)	4,000	Pittsburgh
Command-Aire	3 pl. Open Bi	OX-5	M-931	87	1,200	Portland
Command-Aire	3 pl. Open Bi	OX-5	NC-480-E	118	1,100	Baltimore
Command-Aire	3 pl. Open Bi	OX-5	NC-584-E	5	1,600	Bridgeport
Command-Aire	3 pl. Open Bi	OX-5	NC-580-E	26	1,500	Baltimore
Command-Aire	3 pl. Open Bi	OX-5	907-E	19	1,525	Caldwell, N. J.
Command-Aire	3 pl. Open Bi	OX-5	243-E	50	1,400	Roosevelt Field
Command-Aire	3 pl. Open Bi	165 Whirlwind	974-E	40	4,300	Roosevelt Field
Command-Aire	3 pl. Open Bi	Warner	NC-608-E	43	3,655	Valley Stream
Command-Aire	3 pl. Open Bi	Warner	NC-515	86	3,440	Pittsburgh
Command-Aire	3 pl. Open Bi	Warner	NC-927-E	New	4,300	Boston
Command-Aire	3 pl. Open Bi	Warner	NC-526-E	56	3,590	Boston
Command-Aire	3 pl. Open Bi	165 Whirlwind	NC-977-E	44	4,280	Kansas City
Ireland	Amphibian	300 Whirlwind	NC-109-H	102	17,090	Rockland
Ireland	Amphibian	400 Wasp	NC-90-K	120	21,000	Roosevelt Field
Ireland	Amphibian	300 Whirlwind	NC-111-H	40	17,400	Roosevelt Field

Additional slightly used demonstrators of the lines manufactured by Curtiss-Wright—Robin, Travel Air, Moth and others—are now on sale at various Curtiss-Wright branches throughout the country. Full description and prices will be sent on request.

CURTISS-WRIGHT FLYING SERVICE

DIVISION OF CURTISS-WRIGHT CORPORATION

"World's Oldest Flying Organization"



WARNER JUNIOR ENGINE

THE new Warner Scarab Junior, a five-cylinder radial engine rated 85 horsepower at 1,950 revolutions per minute, has been designed by the Warner Aircraft Corporation for use in light airplanes which are rapidly gaining greater popularity. This model embodies in its construction ninety per cent of the standard Warner Scarab seven-cylinder engine parts.

The crankcase, which is of heat-treated aluminum alloy, is made up in two halves joined on the cylinder centerline. It is well ribbed to obtain strength and stiffness. This construction facilitates assembly and disassembly of the crankshaft and connecting rods as a unit. Into the front and rear halves are inserted two heat-treated machined steel bearing cages, which serve as locating mediums for main shaft ball bearings, preventing local bearing loads being transmitted directly to the softer aluminum of the case. The exterior of rear main bearing case also serves as a bearing sleeve for the rotating cam ring.

The crankshaft is made in one piece from a heat-treated alloy steel drop forging. The shaft is of the one-throw design and machined all over. The crankpin is ground and lapped to exact dimensions. Bronze counterweights are straddle-fitted to the crank cheeks and bolted to them by steel bolts set in reamed holes, thus providing for absorption of torque reactions and centrifugal force. The shaft is supported by three ball bearings, the main bearings being held in contact with the crank cheeks by nuts provided for the purpose. All ball bearings being held by the clamping action of nuts transmitted through special sleeves, their replacement is possible without the use of special tools. The hollow crankpin is fitted with a removable aluminum casting which serves as a trap for grit that might pass the inlet oil screen, and insures that clean oil will be introduced to the master rod bearing. This casting is removable for cleaning at overhaul periods.

Connecting rods of an I-section are made from heat-treated alloy steel drop forgings, and smoothly machined on all surfaces. The master rod is of a split type, four-bolt design, with a centrifugally spun babbitt bearing at the crankpin end. Link rods are assembled to the master rod by means of wrist pins locked into the link rods and take their bearing in bronze bushings, which are drilled to provide full force feed lubrication, and are pressed into the master rod. Bronze bushings also are pressed into the piston end of all rods for the piston pins, which are of the floating type.

Pistons are made from heat-treated permanent mold aluminum castings, and are so designed as to combine lightness with strength. They are fitted with two compression and one oil scraping ring, in addition to an oil collecting groove.

Cylinder assemblies are bolted to the crankcase on eight studs. Cylinder barrels are of alloy steel forgings machined all over and amply finned for cooling. Cylinder heads are made from a heat-treated aluminum alloy casting permanently shrunk and bolted to the cylinder barrels. Bronze valve guides and valves seats are shrunk into the heads. Two spark plugs, screwed into bronze inserts so placed as to cause rapid and complete combustion of the gases and eliminate spark plug fouling, are fitted to each cylinder. Rocker arm housings are separate castings permanently attached to the cylinder heads by a method designed to provide positive means of locating the ball bearing rocker arms.

The cam ring is made from an alloy steel drop forging, machined all over and hardened on all wearing surfaces. The intake and exhaust cam surfaces are side by side, with three cam lobes each. The cam ring revolves at one-sixth crankshaft speed, being supported on a babbitt lined surface of generous proportions and adequately lubricated. This cam ring bearing, being the outer surface of the rear crankshaft ball bearing cage, gives a permanent axis of rotation. The driving gear is integral with the cam ring, and is driven from the auxiliary drive shaft by means of a spur gear train through an idler shaft, which also drives the oil pump.

Cam followers take their bearing in aluminum guides, chill cast in a permanent mold. They are supported in reamed bosses throughout their length, preventing all side motion. The cam followers make contact with the cam by means of rollers, and have at the outer end a spherical socket for the push rod. The push rods are made from duralumin with pressed-on hardened and polished ball ends, and are fully enclosed in an aluminum tube. The upper ball end of the push rod fits into an adjustable socket

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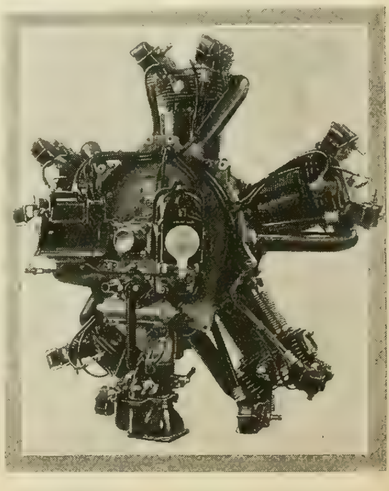
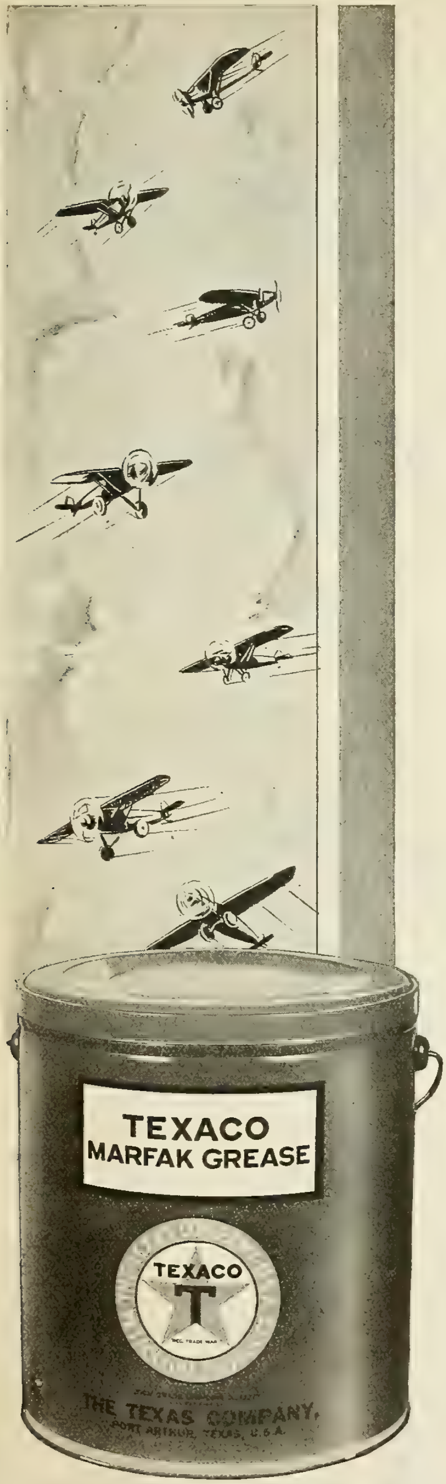


Accessory end, Warner engine



A WINNER IN THE AIR

Many a flight has failed for the lack of an adequate rocker-arm lubricant. Until Texaco Marfak Grease came into the field, the lubrication of rocker-arm assemblies was a problem. Today there is this splendid lubricant. Prominent aviators who have tried it proclaim Texaco Marfak Grease to be the *one* safe lubricant for this critical job. Engine manufacturers have tested it under the most trying conditions and have given their endorsement for its remarkable lasting qualities, efficiency as a lubricant and resistance to high temperatures.

Texaco Marfak Grease, long known for its good work in other fields, is now displacing other lubricants for enclosed rocker-arm assemblies and grease packed bearings in the air. Try it. Texaco Marfak Grease and the internationally well-known Texaco Aviation Gasoline and Airplane Oil, are available at the principal airports throughout the country.

THE TEXAS COMPANY
17 Battery Place New York City

TEXACO AVIATION GASOLINE ● TEXACO AIRPLANE OILS ● TEXACO MARFAK GREASE ●

(Continued from preceding page)

in the rear of the rocker arm, which in turn acts on the valves by means of a roller mounted in the rocker arm, effectually preventing a side motion to the valve stem. To insure adequate retention of the lubricant and exclusion of dirt from the push rod ball ends, the rear half of the rocker arm is enclosed, whereas the front half and the two concentric valve springs are left open in order to receive the cooling effect of the air.

The gear case, bolted to the rear of the induction housing, carries the two magneto drives and the magnetos, and is arranged so as to allow the mounting of a starter between them. It also carries the oil pump, oil strainer, and oil pressure relief valve. It is machined from a heat-treated aluminum casting.

The induction system consists of an annular passage in the aluminum casting which also serves to support the engine in the airplane. The carburetor is attached to the lower part of this passage or ring, and separate intake pipes lead directly to each cylinder.

The engine is of the dry sump type. Oil is drawn from the oil tank by means of a pump, which delivers the oil, under pressure, through a strainer to all plain bearings. The oil forced out of these bearings lubricates all other moving parts in the engine. The oil collecting at the bottom of the crankcase is drawn from there by the scavenging pump and delivered back to the oil tank. An extra precaution against the possibility of delivering other than clean oil to the bearings, is incorporated in the engine by taking advantage of the centrifugal force developed in the crankshaft pin.

Dual Scintilla magnetos are used on the engine, and the carburetor is of the single venturi type, with mixture control and heater. As extra equipment, a Heywood air, hand or electric starter may be fitted.

Specifications

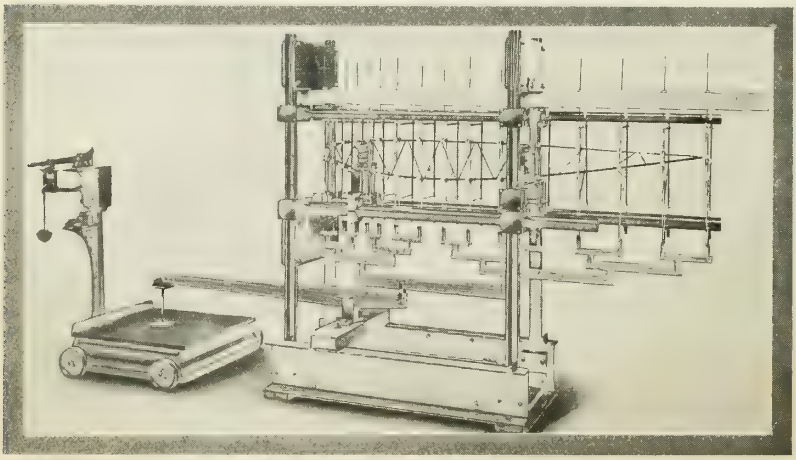
Weight dry (without hub or starter)	230 pounds
Specific weight	2.7 lbs. per horsepower
Fuel consumption at rated power	55 lbs. per h.p. per hour
Fuel consumption	5 to 7.5 gallons per hour
Oil consumption at rated power	.02 lbs. per h.p. per hour
Oil consumption	1 to 1.25 pints per hour
Bore	4.25 inches
Stroke	4.25 inches
Displacement	301.4 cubic inches
Compression ratio	5.2 to 1
Propeller drive	clockwise
Overall diameter	36.25 inches
Overall length (without starter)	29 inches
Diameter of mounting ring circle	17 inches

RIB TESTING APPARATUS

AN APPARATUS for the testing of ribs in airplane wing construction has been developed at the Whitley Works of Sir W. G. Armstrong Whitworth Aircraft, Ltd., of London, England. The apparatus will test such structures by applying the test load in a manner approximating the conditions applying when the part is in service, according to the company. The mechanism is arranged to place stress at a series of points along the rib. The distribution of the load is determined by the curve of air pressure which would occur when the particular section being tested is subjected to actual flight conditions.

The rib is held in a framework free to move vertically without friction, a downward pull being exerted on each unit by a series of levers which apply the required load at the desired points. The framework and levers are supported by adjustable springs. The reaction of the applied load is given to supports upon which rest short lengths of spars fitted in the rib, though free to pivot on them.

An adjustable device permitting a slight downward movement is located above each unit of the frame. When a failure of the rib occurs the distortion remains local and is not communicated to other parts of the rib, thereby making it possible to detect the exact point where the failure occurred.



Armstrong Whitworth testing device for airplane ribs

RECENTLY ISSUED AERO PATENTS

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. Y., Washington, D. C., from whom copies may be obtained at the rate of 20 cents each. State number of patent and name of inventor when ordering.

Automatic deviation and distance integrating apparatus. Edward L. Holmes, New York, N. Y.; assignor to Holmes Navigating Apparatus Co. (No. 1,741,713).

Variable lift wing for aeroplanes. Henry G. Keller, Glenside, Pa. (No. 1,742,082).

Means for enabling light to penetrate foggy atmosphere. Frank A. Wright, Westcliff-on-Sea, England. (No. 1,742,116).

Auxiliary sustaining and propelling means for airplanes. John F. Berry, Lewis, Iowa. (No. 1,742,123).

Apparatus to facilitate aeronavigation. Adirio O. Jessen, Valparaiso, Chile. (No. 1,742,355).

Propeller mechanism. Frank V. Barnow, Fleming, Ky. (No. 1,742,374).

Aircraft. Jeffrey A. Cuddy, Cleveland, Ohio. (No. 1,742,461).

Sustaining-propeller of the helicopter type. Etienne Oehmichen, Valentigney, France. (No. 1,742,665).

Airplane and radiator therefor. Albert S. Heinrich, Freeport, N. Y. (No. 1,742,705).

Combined airplane and helicopter. Sidney G. Newborn, Wilson, N. C. (No. 1,742,715).

Helicopter. John E. Hess, New Westminster, B. C. (No. 1,742,808).

Aeroplane. Jacob B. & Simon Grinoch, New York, N. Y. (No. 1,742,910).

Propeller for aircraft. Alfred G. Schumann, Baltimore, Md. (No. 1,742,938).

Rigid airship. Steven P. Putusz, Passaic, N. J. (No. 1,742,969).

Airplane construction. Thoralf Borgan, Brooklyn, N. Y. (No. 1,743,020).

Remote-control device (remote control radio device for airplanes). Carlos B. Mirick, Washington, D. C. (No. 1,743,078).

Flying-machine. Claudius Dornier, Friedrichshafen-on-the-Bodensee, Germany. (No. 1,745,749)

Steerable tail-skid for aeroplanes. Lester G. Querry, Huntington, Pa. (No. 1,745,808)

Bomb-sight. Grandison Gardner, Honolulu, Hawaii, and Charles L. Paulus, Dayton, Ohio. (No. 1,745,895)

Aerocartograph. Reinhard Hugershoff, Dresden, Germany. (No. 1,745,897)

Fire-extinguisher for aircraft. Charles L. Paulus and Robert Kauch, Dayton, Ohio. (No. 1,745,909)

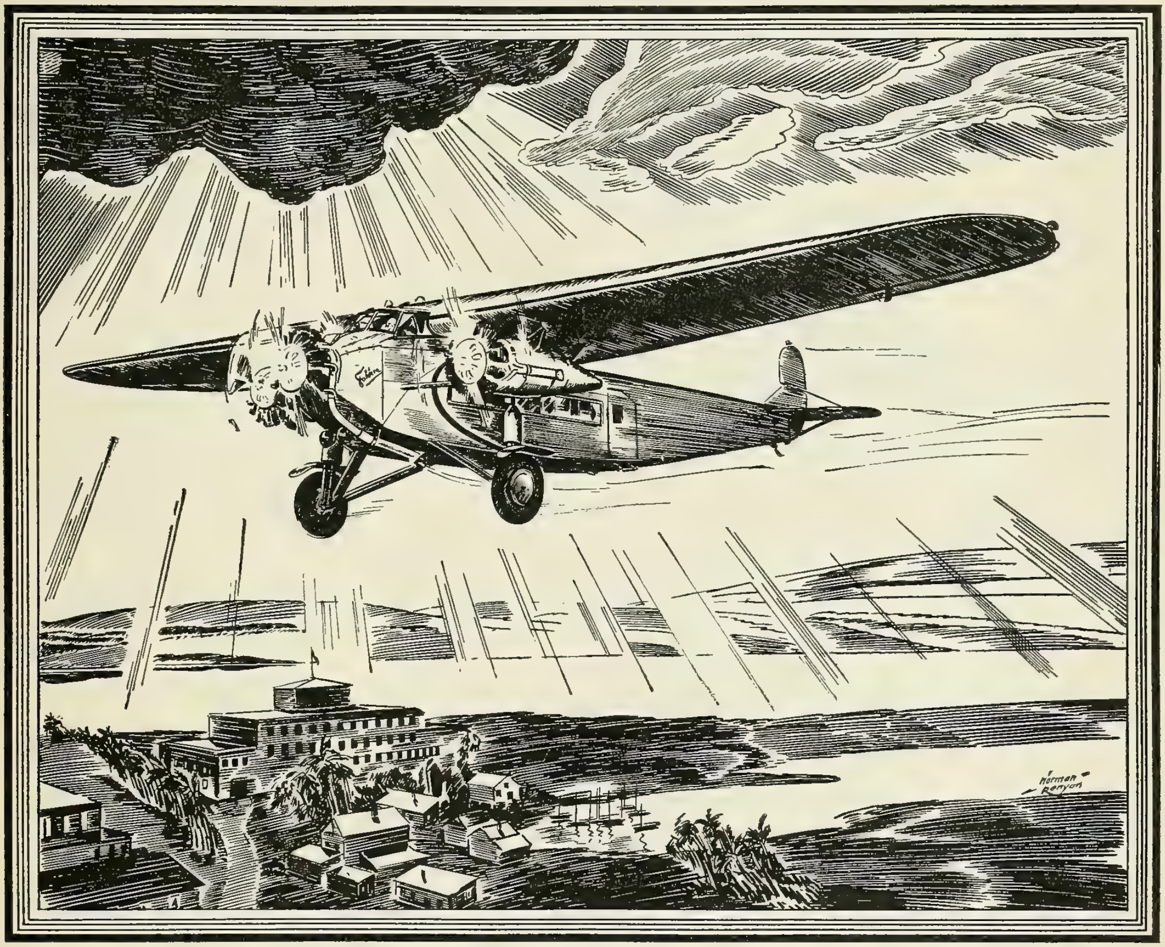
Apparatus for maintaining the direction of aircraft in flight. Robert Kauch and Charles L. Paulus, Dayton, Ohio. (No. 1,745,933)

Combination brake and rudder pedal for aircraft. Robert J. Minshall, Seattle, Wash.; assignor to Boeing Airplane Co., Seattle, Wash. (No. 1,746,008)

(Continued on next page)

FOKKER FACTS—III

THEN CAME THE F-10 TRI-MOTOR



A PROMINENT air line wanted a new type of transport. It set up rigid specifications for greater safety, speed and economy. Few thought that such a phenomenal airplane could be built.

Fokker's answer was the F-10, a 14-place trimotor, which not only met the requirements but went well beyond them. Today, with many improvements, more F-10's are used than any other ship of their capacity in the world.

Powered with three Pratt & Whitney 425 h.p. Wasp engines, the F-10 has a high speed of 140 m.p.h. and a cruising speed of 118 m.p.h. Its range is 6½ hours, 765 miles.

Back of this ship stands Fokker's experience in building more planes than any other manufacturer, Fokker's accomplishment in making twice as many great pioneering flights as any other make of plane, Fokker's record of 25,000,000 miles of dependable travel on American transport lines, and Fokker's affiliation with the vast resources of General Motors Corporation.

Because of economies due to the production principles of General Motors, prices are probably less than you might expect. Convenient terms may now be arranged on the GMAC finance plan.

For the use of business executives, for pleasure, and for transport use, Fokker now makes ten different models of airplanes: single and multi-engined types, land planes, sea planes, flying boats, amphibions. Requests for information or demonstration are invited, and will be promptly answered. Fokker Aircraft Corporation of America, General Motors Building, New York.

FOKKER

AFFILIATED WITH GENERAL MOTORS CORPORATION

(Continued from preceding page)

Airplane-brake. Charles J. Smith, Dearborn, and Harold A. Hicks, Detroit, Mich.; assignors to Ford Motor Co., Detroit. (No. 1,746,017)

Electroluminescent tube beacon. Alfred L. Brandt, sr., Buffalo, N. Y.; assignor to Flexlume Corporation, Tonowanda, N. Y. (No. 1,746,024)

Airplane. Charles Kinzel, Nutley, N. J. (No. 1,746,042)

Air-haven for flying-machines. Donald C. Carter, Cambridge, Ohio. (No. 1,746,101)

Airplane-wing. Jarrot Bobo, Carpenter, Ohio; (No. 1,746,140)

Kite apparatus. Orville E. Johnson, Chattanooga, Tenn. (No. 1,746,157)

Heavier-than-air craft. Joseph W. Shean, Spearville, Kans. (No. 1,746,320)

Flying-machine. Joseph Dubina, Cicero, Ill. (No. 1,746,343)

Airplane-carburetor. Frank C. Mock, Chicago, Ill.; assignor to Stromberg Motor Devices Co., Chicago. (No. 1,746,358)

Airplane. Ralph J. Mellick and Flavius E. Loudy, Cleveland, Ohio; assignors to Glenn L. Martin Co. (No. 1,746,669)

Aeroplane. L. D. Sutfin, Columbus, Ohio. (No. 1,746,747)

Dual control for airplanes. Otto A. Braun, Fond du Las, Wis. (No. 1,746,762)

Parachute. William M. Martin, New York, N. Y. (No. 1,746,862)

Aero fuel. (Refueling station for airplanes.) Morris S. Fairchild, New York, N. Y. (No. 1,746,996)

Aeroplane construction. Michael Gregor, New York, N. Y. (No. 1,747,001)

Safety device for aeroplanes. Martha Bergh, Los Angeles, Cal. (No. 1,747,215)

Steering-gear for airships. Jesse D. Langdon, Los Angeles, Cal. (No. 1,747,251)

Power-distribution system for aircraft. Hugo Sundstedt, New York, N. Y. (No. 1,747,334)

Aeroplane steering mechanism. Harry S. Bell, Paterson, N. J. (No. 1,747,344).

Pontoon for airplanes. Joseph G. Yonkese, Brooklyn, N. Y. (No. 1,747,563)

Control mechanism for aircraft. Joseph G. Yonkese, Brooklyn, N. Y. (No. 1,747,564)

Empennage structure for aircraft. Joseph G. Yonkese, Brooklyn, N. Y. (No. 1,747,565)

Airplane landing floor. Gavin Hadden, New York, and Charles A. Holden, New Rochelle, N. Y.; Holden assignor to Hadden. (No. 1,747,582.

System of runways. Gavin Hadden, New York, and Charles A. Holden, New Rochelle, N. Y.; Holden assignor to Hadden. (No. 1,747,583).

Flying-machine. John V. Janin, Seattle, Wash. (No. 1,747,585)

Adjustable aeroplane-wing. Alf N. Larsen, Ogden, Utah. (No. 1,747,637)

Airplane. Vincent J. Burnelli, New York, N. Y.; assignor to Uppercu-Burnelli Corporation. (No. 1,747,695)

Retractable wheel for the pontoons of amphibion airplanes. Vincent J. Burnelli, New York, N. Y.; assignor to Uppercu-Burnelli Corporation. (No. 1,747,696)

Aircraft control. Clark R. Kimble, Artesia, Cal. (No. 1,747,777)

Vertical ascending and descending aeroplane. John F. Darling, Garden City, N. Y. (No. 1,747,890)

Airplane construction. Hugo Sundstedt, New York, N. Y. (No. 1,748,252)

Aeroplane construction. La Verne F. Wertz, Buffalo, N. Y. (No. 1,748,262)

Airplane. Lessiter C. Milburn, Cleveland, Ohio; assignor to Glenn L. Martin Co. (No. 1,748,302)

Position-indicator for aircraft. James T. Morse, Brentwood Heights, Calif. (No. 1,748,454)

Floating and cushioning device for aeroplanes. George Mikula, Jersey City, N. J. (No. 1,748,492)

Mooring of airships. Herbert V. Thaden, Detroit, Mich.; assignor to Aircraft Development Corporation, Detroit. (No. 1,748,500)

Automatic air-vehicle stabilizer. Anton L. Veit, San Francisco, Calif. (No. 1,748,502)

Ground control means for aeroplanes. Walter A. Meador, Gallitin, Tenn. (No. 1,748,517)

Method and means for landing and launching aircraft and aircraft-freight. Eldred F. Tucker, Los Angeles, Calif. (No. 1,748,663)

Aeroplane. Charles C. Warren, Chickasha, Okla. (No. 1,748,811)

Aeroplane. Bert Messick, Lansing, Mich. (No. 1,748,987)

Aeroplane. Edward H. Davis, Cincinnati, Ohio. (No. 1,749,021)

Airplane. George C. St. Louis, Fresno, Calif. (No. 1,749,047)

Means for berthing airships. Charles D. Burney, Westminster, London, England; assignor to Airship Guarantee Co., Ltd., London. (No. 1,749,065)

Airplane. Albin J. Erickson, Chicago, Ill. No. 1,749,132)

Airplane-control mechanism. Milo Morrill, Provo, Utah. (No. 1,749,256)

Airplane. William W. Bird, San Diego, Calif. (No. 1,749,272)

Aeroplane-wing rib. Caleb J. Marston and Perley W. Ordway, Loudon, N. H. (No. 1,749,293)

Wind-screen for airplane-platforms. Richard Gibbons, Brooklyn, N. Y. (No. 1,749,338)

Aircraft-launching apparatus. Ernst M. Schmelz, Detroit, Mich. (No. 1,749,357)

Shock-absorbing landing-hook. Robert J. Minshall, Seattle, Wash.; assignor to Boeing Airplane Co., Seattle, Wash. (No. 1,749,438)

Helicopter. George de Bothezat, New York, N. Y. (No. 1,749,471)

Balloon-envelope. Junius D. Edwards, Oakmont, Pa.; assignor to Aluminum Company of America, Pittsburgh, Pa. (No. 1,749,474)

Braking of the undercarriage or landing-wheels of aeroplanes and like aircraft. Martin C. Macpherson, Hayes, England. (No. 1,749,495)

Aerial distribution of materials. Clifford L. Pelton, Norristown, Pa. (No. 1,749,504)

Aircraft empennage. Edward L. Reynolds, Tulsa, Okla. (No. 1,749,507)

Aeroplane. Albert W. Dorgan, Birmingham, Mich. (No. 1,749,572)

ELGIN INSTRUMENT PANEL

A new aircraft instrument panel has been developed by the Elgin National Watch Company. The panel includes tachometer, air-speed indicator, compass, altimeter, pressure gauge, thermometer, ice-warning indicator, clock, and turn and bank indicator.

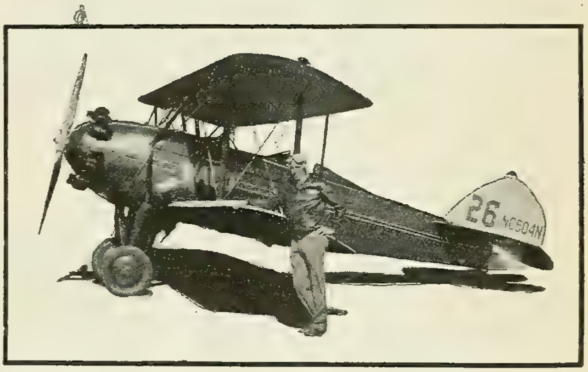
The chassis of the air-speed indicator and the altimeter are made of one-piece castings to provide rigidity and alignment. These two instruments are equipped with four jewels similar to those used in watch mechanisms.

Below the compass a frame retains the card for noting corrections of the compass course due to magnetic deviation.

Elgin airplane panel unit containing flying and engine instruments

A TEST OF RELIABILITY

TO THE FINISH



17 out of the 29 planes which participated in the National Air Tour, including the two winning Wacos, were equipped with Goodrich Split-second Silvertowns. Above Waco gained first honors.

. . . and Goodrich Silvertowns came through *with Flying Colors*

"*ACCEPT our congratulations on your tires used on winning Wacos in National Air Tour stop They were subjected to great strain in spectacular take-offs and landings where tires were skidded to a stop Goodrich came through with flying colors*"

▪ ▪ ▪ ▪

This telegram expresses the true attitude of the Waco Aircraft Co. concerning Goodrich Tires.

For here was a real test of reliability, stamina. Here was a nation-wide tour, composed of 29 contesting planes, consuming 15 flying days, covering 5,017 flying miles organized to prove that transportation by air can be maintained, day in and day out, with the efficiency of a modern railroad.

Obviously tires received punishment of the most severe sort.

It is a tribute to Goodrich that not only were the two winning Waco planes equipped with Silvertowns but also that 17 out of the 29 planes participating in the Tour used Goodrich Tires.

The B. F. Goodrich Rubber Co., Established 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ontario.

★

THREE GOODRICH AIRPLANE TIRES!

Tail Wheel . Non Skid . Smooth Tread

★

Goodrich

RUBBER FOR AIRPLANES

BURNET-MUREAUX MONOPLANE

THE French have utilized the monoplane and the sesquiplane for reconnaissance work and pursuit work probably more than any other nation, and employ several types of planes under these classifications in their military services at present. One of the newest of these monoplanes designed for high performance military work is the Brunet-Les Mureaux reconnaissance monoplane, which was recently completed in the Ateliers des Mureaux in Boulogne-sur-Seine, outside of Paris, and put through its tests at the Villacoublay Field.

The new plane was designed by Monsier Brunet, one of the younger engineers of the French aeronautical industry, and is designated as the 130 A-2. It is a two-place monoplane with a parasol wing of large span, designed for efficient operation at high altitudes. The first of the 130 A-2 monoplanes is equipped with a 500-horsepower Hispano-Suiza engine. Performances given here with are with that power plant, though the plane has been designed to be fitted with other engines as ell.

This plane is of metal construction throughout. Its rigid structure and the complete absence of wires between demountable sections permit easy mounting and demounting.

Because of the simplicity of its construction, repairs can, to a great extent, be effected with ordinary tools and unskilled labor.

In shape the wing is rectangular with rounded ends. The airfoil is known as the Brunet 7. The wing is thick in section, and the span measures 15 metres. The wing is built in two section, which are joined at the center over the fuselage and supported by inverted Vee cabane struts. The ailerons are long and have a narrow chord. They are actuated by a semi-rigid control and may be operated either similtaneously or differentially. The wing is rigidly braced on each side by a pair of N-struts attached to the wing spars at center section and extending obliquely to the landing gear.

The wing structure is made up of box spars and tubular ribs of duralumin, and the two spars and the ribs in U section form a Warren girder. The leading edge is covered with duralumin sheet, the remainder of the wing being fabric covered.

The fuselage form has been studied particularly to allow its occupants maximum visibility in all directions but especially below. It is rectangular in cross-section with an arched top that is well streamlined. The fuselage is built up of four longerons of duralumin tube braced by vertical and diagonal members of duralumin and joined to intersecting members by rivets. The front of the fuselage is covered with duralumin sheet as back as far as the aft cockpit, the remainder of the fuselage being covered with fabric.

The pilot's cockpit is placed slightly behind the trailing edge of the wing. Immediately behind it is the cockpit of the gunner-observer around which is built a turret supporting a gun ring that permits the occupant to shoot in all directions, except directly below the fuselage. The gunner-observer's cockpit contains all devices and instruments necessary for the efficient operation of aircraft designed for reconnaissance work. The gunner-observer has at his disposal a radio sending and receiving set. He also operates a photographic apparatus which is placed at the end of a special support, allowing it to be used at all angles of downward inclination. A bomb release can be fitted into the bottom of the fuselage in place of the camera, and there is also at the disposal of the gunner-observer a second machine gun which fires downward through the fuselage. Also in this cockpit are the usual instruments necessary for the work of the occupant, a small shelf for writing equipment, sights for the machine guns, signal fuses, etc.

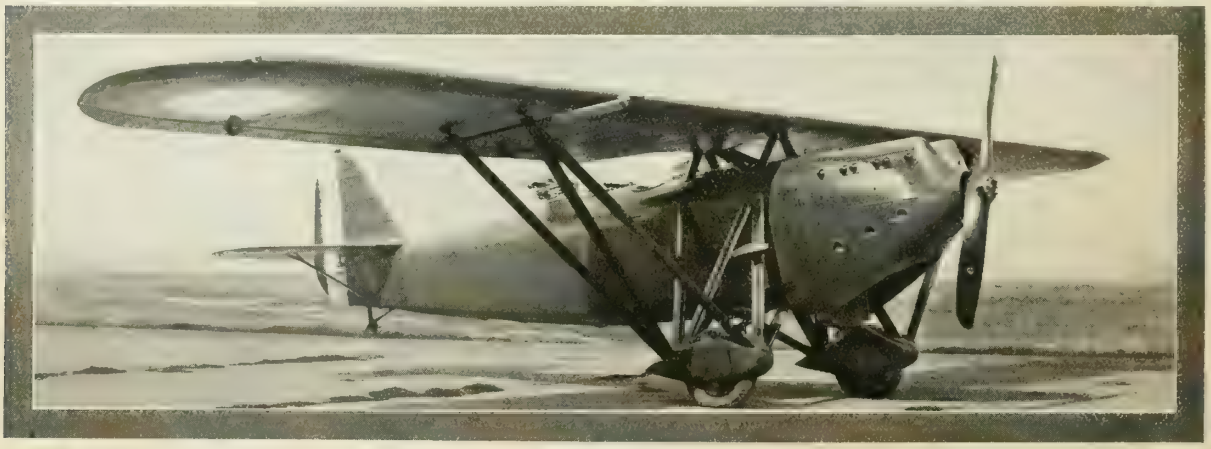
The horizontal empenage consists of a stabilizer and two elevating planes which are unbalanced. The stabilizer is externally braced on either side by oblique members. The vertical group consists of a fin and an unbalanced rudder, which, like the elevating planes, is actuated by external rods which are attached to cables inside the fuselage. The tail surfaces are built up of duralumin longerons and ribs in U section covered with fabric.

Two engine mountings have been designed and adapted for use with this plane, one being for the Hispano-Suiza 12 H.B. 500-horsepower engine and the second for the Salmson engine of equivalent power. The engine mountings are of duralumin tubing bolted to the longerons of the fuselage. The oil tank and fire extinguishing equipment are installed immediately behind the motor. The principal fuel tank, which can be dropped in an emergency, is installed between the engine and the pilot's cockpit.

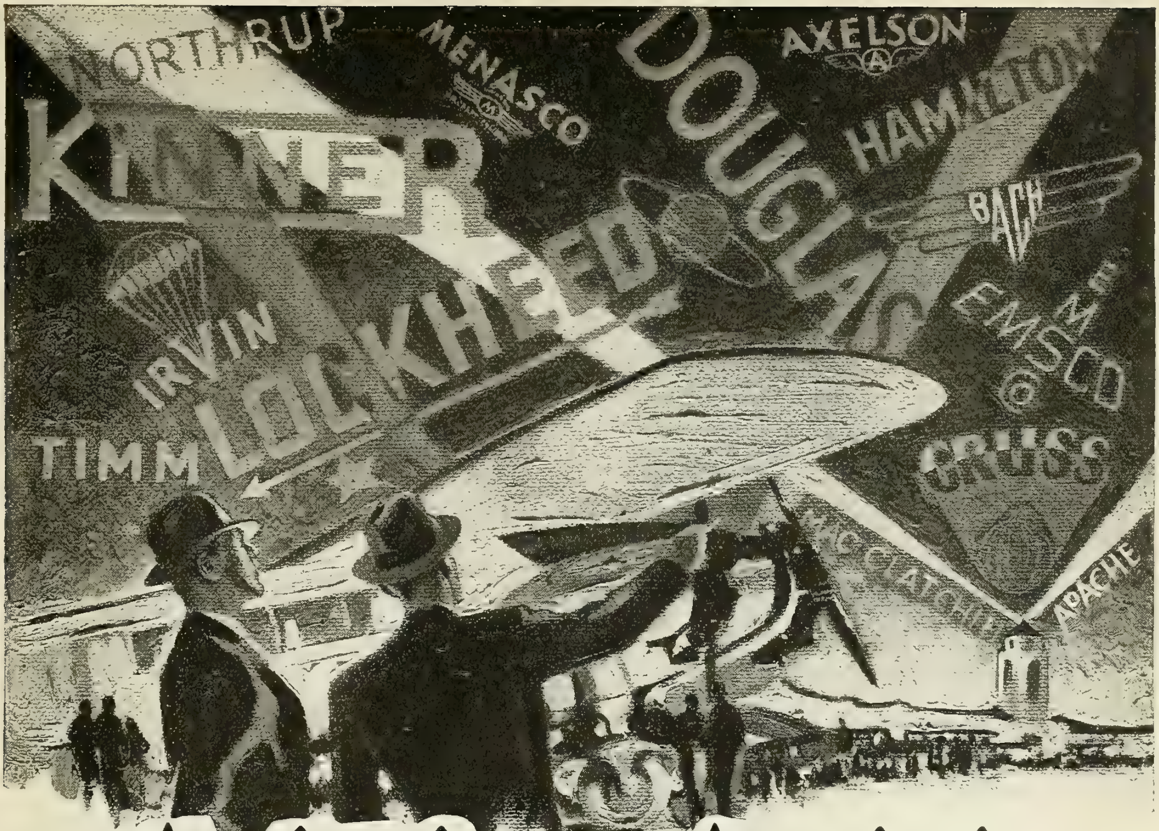
The undercarriage is of the divided axle type, composed of two units consisting of N-struts extending from the upper longerons of the fuselage and also from the outer sections of the wings. Additional support is provided by N-struts extending from the lower longerons of the fuselage. The lower extremities of these N-struts are joined to box frames of duralumin which support the wheels and the shock absorbers. These box frames are covered by streamlined cowlings of duralumin sheet. The wheels are quipped with brakes and the track of this landing gear is 2 metres 60. Performances given below were actually demonstrated before official government technicians at the Villacoublay Field, where new planes intended for the military service are often tested.

Specifications

Span	49 feet
Length	27 feet
Height	10 feet
Chord	7.5 feet
Wing area	350 square feet
Weight empty	2,926 pounds
Weight of fuel	573 pounds
Disposable load	977 pounds
Bross weight loaded	4,476 pounds
Wing loading	12.8 pounds per square foot
Power loading	8.8 pounds per horsepower
High speed at ground level	143 miles per
Speed at 3,281 feet	141 miles per hour
Speed at 16,000 feet	137 miles per hour
Time of climb to 3,281 feet	2 minutes
Time of climb to 16,000 feet	17 min. 45 sec.
Demonstrated ceiling	22,311 feet
Theoretical ceiling	25,592 feet



A new French reconnaissance monoplane of high performance, the Brunet-Mureau



Aviation Activity Now Centers HERE!

No snow, no sleet, no ice, no winter blizzards to interrupt flying or slow down production.

Average velocity of wind, 5 M.P.H.

55 Airports and Landing Fields.

More Licensed Pilots than in any other County in the United States.

Adequate supply of skilled expert labor.

25, or more, aviation schools now training over 2500 students.

Low Building Costs.

Hydro-electric power, natural gas and fuel oil, and abundant water... all at low cost.

Ideal Labor and Living Conditions.

Leading manufacturers of aircraft, airplane motors, parts, and equipment, who are making history in the aviation industry today, now have either major or branch plants in Los Angeles County.

Climatic and general flying conditions favorable to the industry and peculiar to this area make it possible for the manufacturer to operate more profitably here than in less-favored sections.

The aviation center of America is already established in Los Angeles County and the greater development of the future is bound to occur here.

Manufacturers who are interested in facts pertaining to the aircraft industry and its opportunities in Los Angeles County, are invited to communicate with the Industrial Department of the Los Angeles Chamber of Commerce.

Air-Minded

LOS ANGELES COUNTY

BELLANCA 1930 PACEMAKER

THE 1930 Bellanca "Pacemaker," manufactured under Approved Type Certificate 129 by the Bellanca Aircraft Corporation of New Castle, Delaware, is a six-place cabin monoplane powered with a Wright Whirlwind 300. This ship is an improvement of the original Pacemaker which was developed from the Bellanca CH. The earlier Pacemaker model was described in the November, 1929, issue of AERO DIGEST.

It was with this ship that Elinor Smith established a new world altitude record for women of 27,418 feet in a flight at Roosevelt Field, L. I., on March 10, and George Haldeman broke the world's altitude record for commercial airplanes in a flight at New Castle, Delaware, February 28, in which he ascended to a height of 30,453 feet.

Float gear attachment fittings integral with the fuselage are provided and the ship may be readily converted into a seaplane. Edo twin floats of metal have been substituted for the regular landing gear for take-offs and landings on the water in test flights, and satisfactory results have been obtained with this equipment.

The wings are of two-spar construction, kiln-dried spruce being used. Covering is with grade A airplane fabric. The ribs are built of spruce, bass and balsa woods, and no nails are used in their construction, glue being used throughout. The ribs are of the triangular truss type and are attached to the spars by means of glue and nails. Each rib is fastened to light spruce stringers running from wing root to wing tip about midway of the chord. These are designed to stiffen the ribs and hold them vertically beneath the fabric. The ribs weigh from thirteen to fourteen ounces each and have withstood a distributed load of 1,200 pounds. Where lift-strut fittings are placed, the spars are reinforced by strips of ¼-inch birch plywood, and the ends of the spars to which wing hinge fittings are fixed are strengthened by strips of ¼-inch birch plywood on each side.

The compression members are of routed spruce and are joined together by square section tie-rods, two sets of tie-rods being used, spaced as far apart vertically as possible. The leading edge of each wing is of plywood back as far as the front spar. Special attention has been given to the design of the wing tip, which is formed by a 1¼-inch box rib and is tapered so as to reduce the wing drag to a minimum by decreasing the wing tip vortex.

Two gasoline tanks of welded aluminum are provided, and each has a capacity of fifty-six gallons. Each tank is housed in a section between two box ribs and two spars, resting on felt pads top and bottom and made to fit snugly by means of balsa wood blocks. Two steel cables cross each other vertically on top of each tank The tank in the right wing has an emergency compartment with a 6½-gallon capacity.

The ailerons are of the slot-balanced type and are operated by cables running over ball-bearing Micarta pulleys which are three and one-half inches in diameter.

The fuselage is constructed of welded chrome-molybdenum steel tubing. The main cross member at the bottom of the fuselage, to which the landing gear is attached, is a heavy-gauge four-inch chrome-molybdenum steel tube which is heat treated to a high tensile strength and which is incorporated into the frame of the fuselage by a special process. This tube extends beyond the fuselage on each side about one foot and forms the base for the small combination wing stubs and steps to which the lower ends of the front lift-struts are attached.

The landing gear is of the split-axle type, Oil-draulic struts being incorporated as shock absorbing units. The travel of the shock units is six inches. Bendix wheels 32 by 6 inches and Bendix brakes are provided, in addition to a 12 by 4-inch tail wheel with a pneumatic tire. Round chrome-molybdenum steel tubing is used throughout, and the entire landing gear is faired with heavy-gauge sheet metal.

An automobile-type lift-up cowling is provided and is designed to make the entire engine installation easily accessible for inspection and repairs. The oil-cooling system, developed by the Bellanca company, was designed to facilitate longer engine life by preventing the lubricating qualities of the oil from being impaired by excessive heat. The engine drives a Hamilton or Standard steel adjustable propeller.

The cabin of the Pacemaker is provided with six seats built of light steel tubing and upholstered with two-tone auto fabric. The windows are equipped with non-shatterable glass, silk roller shades and mahogany frames. The rear windows may be opened for ventilation. A skylight window is located in the top of the cabin. All the seats are provided with leather safety belts. A heater has been installed in the cabin to provide comfort in cold weather. Toilet facilities are optional. The interior of the cabin is free from obstructing fuselage members and is protected on all sides by members of double construction and gusseted cross-frames. Extending the length of the

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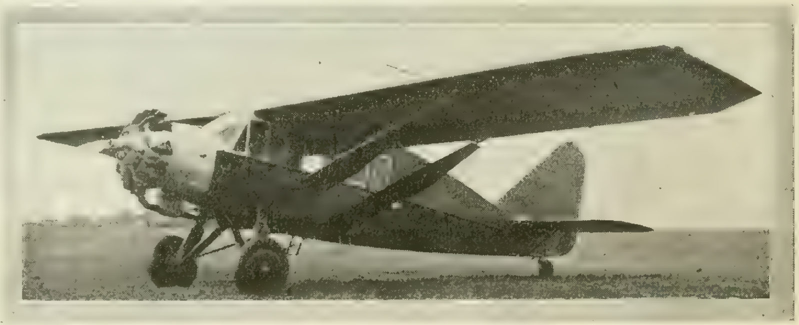
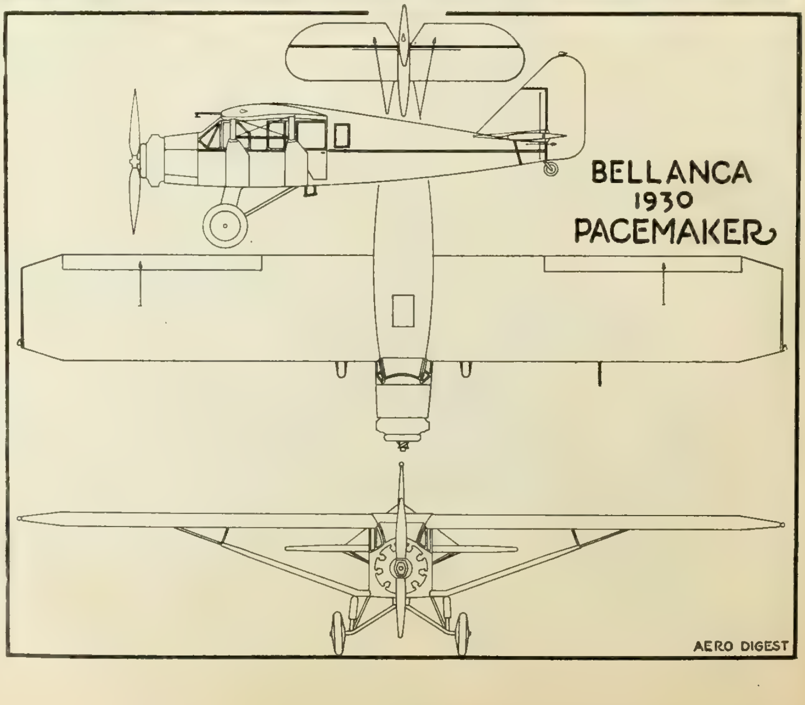




THREE GOOD REASONS WHY . . . BELLANCA AIRCRAFT will dominate this year

—a statement from G. M. BELLANCA

1.

THE BELLANCA PACEMAKER is the first reason why we are confident that our line of airplanes *will persist in their position of first place for efficiency*. The *Pacemaker* has proved its superiority in quality, speed, safety and immense carrying capacity. It is now powered with either the Wright Whirlwind J-6 or the Pratt & Whitney Wasp Junior. Increasing sales of this fast six-place monoplane, my original enclosed cabin type, show that with the *Pacemaker* we are supplying a definite demand for a quality plane equally successful for operation on wheel gear, floats or skiis.

The Pacemaker

2.

THE BELLANCA SKYROCKET is our second reason for predicting dominance in 1930. Equipped with the efficient 420 h.p. Pratt & Whitney Wasp engine, a plane of increased power and dimension, the *Skyrocket* retains all of the well-known characteristics of the *Pacemaker*, providing an unrivalled combination of quick take-off, steep climb, high speed, ruggedness and stability. Its full speed is 150 m.p.h., its climb 1,450 ft., per minute, and its useful load 2,050 lbs. The *Skyrocket* is in every sense a luxury plane.

The Skyrocket

3.

THE BELLANCA AIRBUS is a 12 to 14 place plane with large, comfortable cabin, designed for airline operation. It carries 12 passengers and one pilot or 11 passengers and two pilots, with ample baggage space. We have convinced ourselves through extensive experimental work and flight testing that this plane is ready to serve *with complete satisfaction.* We have given it a wing area of 646 sq. ft., and the interchangeable engine mounting will accommodate the Pratt & Whitney Hornet, the Wright Cyclone, or the Curtiss Conqueror, all geared down. Because of its unusual reserve performance, the new AIRBUS will carry a useful load of 4,100 lbs., with utmost ease, on either wheel gear or floats, making 145 m.p.h. as a landplane or 135 m.p.h. as a seaplane. For economy, we expect the AIRBUS to save nearly 40% of the current operating costs per passenger mile as compared with trimotored craft of similar capacity. Here is our third good reason for counting this another big year! And behind these are many other reasons and facts which our sales department will be glad to send to you on request.—G. M. BELLANCA, Pres.

BELLANCA AIRCRAFT CORPORATION
NEW CASTLE, DELAWARE

BELLANCA

(Continued from preceding page)

cabin under the window sills on each side are supplementary longitudinal members consisting of two steel tubes joined together by a strip of chrome-molybdenum sheet steel welded to both tubes throughout their lengths. The main vertical members on each side of the cabin and the main cross member at the top of the cabin are built in the same manner. A baggage compartment with a capacity of twelve cubic feet is provided. Dual controls are standard equipment, one set being removable.

The tail surfaces are constructed of wood and steel and are covered with airplane fabric. A hand inertia starter operated from the cockpit is provided, in addition to navigation, cabin and instrument board lights. Standard instruments include tachometer, oil pressure gauge, oil temperature gauge, altimeter, magnetic compass, air speed indicator, gasoline level gauges, clock, and turn and bank indicator.

Specifications

Span	46 feet 4 inches
Length overall	27 feet 9 inches
Height overall	8 feet 4 inches
Wing area	273 square feet
Weight empty	2,363 pounds
Disposable load	1,937 pounds
Payload	1,042 pounds
Gross weight	4,300 pounds
Gasoline capacity	112 gallons
Oil capacity	7 gallons

Performance

High speed	145 miles per hour
Cruising speed	122 miles per hour
Climb	1,000 feet per minute
Service ceiling	18,000 feet
Cruising radius	850 miles

SHOCK STRUTS

By W. King Jenkins, *Chief Engineer Gruss Air Spring Company of America, Ltd.*

THE shock absorber is one of the most highly stressed parts of an airplane. Upon it rests the duty of cushioning the entire weight of the airplane upon landing. The oleo-pneumatic type provides a sealed column of air which instantly reacts to loads imposed upon it, acting to store energy transmitted to it in a fraction of a second for dissipation at a controlled rate, so that at no time can more than the design load be transmitted to the airplane structure.

The construction of this type of shock absorber is that of a column-within-a-column. Units can be made to withstand cantilever loads and to carry brake torque with only the slightest and sometimes no increase in weight.

The controlled action and reaction of the oleo-pneumatic strut provide instant deflection on descent and for rolling over obstacles, accompanied by the dissipation by the recoil check of the energy released. If the installation is properly made, the airplane need never leave an even keel while in contact with the ground. The variation in static loads is automatically compensated for by increasing and decreasing the air column.

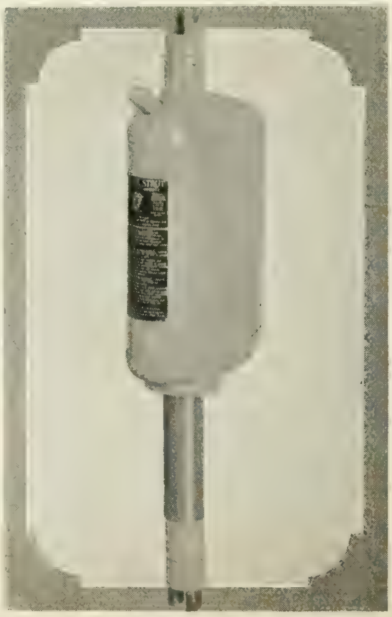
Constant research towards the refinement of Gruss Air Struts has brought into use several improvements. Gruss engineers have developed a special composition packing which assures freedom from leakage of air or oil under all conditions. An automatic packing adjustment and oil compensator have been embodied within the mechanism, which features eliminate the necessity for service adjustments and maintenance attention. The weight of these shock absorbers is but a small percentage of that of the airplane upon which they are installed. To calibrate the action of the shock absorbers under working conditions reproduced in the laboratory, Gruss engineers developed the original impact and recoil recording machine. This apparatus can be made to subject the shock absorbers to loads far in excess of those ever encountered in service, so that ultimate breakdowns and crystallizations may be determined and eliminated. In addition, accurate data can be obtained for stresses acting throughout the device and an exact value of efficiency determined.

NEW FAFNIR BEARING LINE FOR PLANE CONTROL SYSTEMS

FOLLOWING the completion of a study of ball bearing application to airplane control systems, undertaken in conjunction with the Army and Navy air services and leading aircraft manufacturers, the Fafnir Bearing Company, of New Britain, Conn., is producing a full line of ball bearings.

In addition to ball bearings for stabilizer adjustment mechanisms, rudder and brake pedal bars, steering wheels and sprockets, stick mechanisms, bell cranks and other control devices, the Fafnir company is producing ball bearing units for airplane wheels.

In the adaptation of ball bearings to airplane control systems, cartridges of self-contained construction, containing single or double rows of balls, are being made by Fafnir for exposed control points, particularly ailerons, rudders, elevators, wing shots and flaps.



Gruss Streamlined Shock Strut

Ball bearings applied to control pulleys, which are made by Fafnir in the double-seal, single-row type, are described as having the following characteristics: Pulleys run concentric, pulley wobble is eliminated, greasing is not required, and pulley replacements are less frequent. These pulleys are available also in the Army-Navy standard sizes.

VAPOR DEGREASOR FOR METAL

A NEW vapor bath process for the degreasing of metals and other impervious materials, has been developed by the Carrier Engineering Corporation of Newark, N. J., and will shortly be made commercially available.

In this process a solvent known by the Carrier trade name of Cecolene is boiled and vaporized. In the standard tank form of the apparatus the vapor rises to the level of water-cooled condenser coils around the sides near the top of the tank, is condensed and precipitated to the bottom of the tank. Since the vapor is more than three times as dense as air there is no tendency to overflow or escape.

The objects to be degreased are suspended in the vapor, which condenses on their cold surfaces and at once runs off carrying with it all grease. The objects are kept in the vapor until they heat up to its temperature, in from one and one-half to three minutes, the time depending upon the gauge or weight of the metal or other material. They are then removed in a warm, perfectly dry and clean state, any foreign matter remaining being in the form of dust easily removable.

The Vapor Degreaser is to be made in standard dip tank units and in special designs adaptable to any size or style of continuous conveyor in line assemblies, and to steam, gas or electric heating. The makers are prepared to make survey of any special degreasing problems.

GLIDDEN FLOAT COATING

BY emulsifying, through a special process, asphalt and water, The Glidden Company has produced a pure asphalt coating for the interior of pontoons (Glidair No. 12 Interior Pontoon Coating).

When naptha is used as a reducer with asphalt, there is a combining of the natural asphaltic oils and the volatile naptha. Evaporation carries off the naptha fumes as well as asphaltic oils, leaving a more or less brittle film.

On the other hand, this product, being emulsified with water, does not carry off any asphaltic oils when the water evaporation takes place. This evaporation of the water leaves an asphalt coating. Once the water evaporates the asphalt particles coalesce or flow together, forming a waterproof coating unaffected by moisture.

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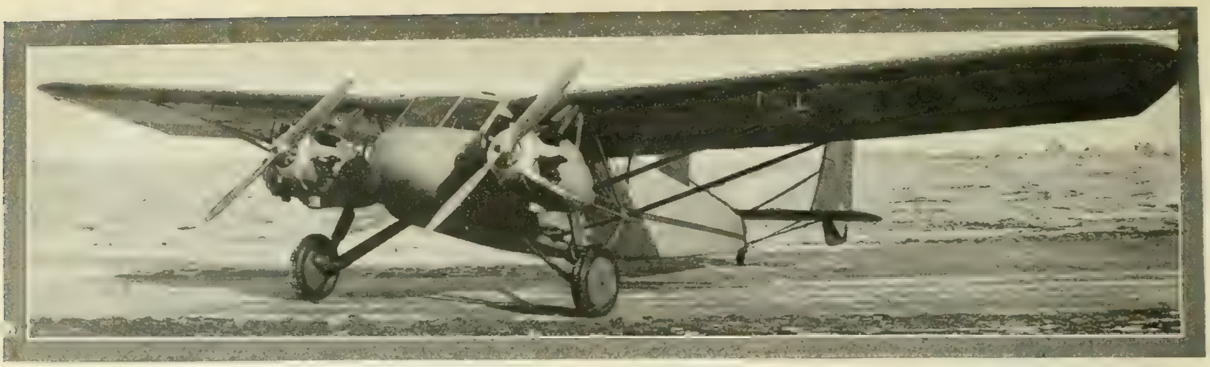
BOHNALITE

Reducing The Load

The essential value of Bohnalite castings is their ability to reduce the dead load and increase the pay load. The invariable and constant quality of Bohnalite light alloy castings has won them a high standing in this, the world's most exacting industry. Complete exhibit at the Detroit Show.

Aircraft Division
BOHN ALUMINUM & BRASS CORPORATION
DETROIT, MICHIGAN
New York Chicago Philadelphia Cleveland Pittsburgh

62% LIGHTER THAN IRON



CURTISS KINGBIRD

THE Curtiss Kingbird, a seven or eight-place twin-engine cabin monoplane designed for private owners, was first exhibited to the public by the Curtiss-Wright Corporation at the International Aircraft Show, St. Louis, Mo., February 15-23. The ship was developed after more than a year's research in the experimental laboratory of the Curtiss Aeroplane and Motor Company at Garden City, L. I.

Experimental flights conducted by the company have shown that the Kingbird has a high speed of 135 miles per hour and a cruising speed between 115 and 120 miles per hour. The ship is powered with two Wright Whirlwind engines of 225 horsepower each and has a service ceiling of 14,700 feet. According to the company, the ship with full load flies on either engine.

In addition to use by private owners, the Kingbird has been designed for passenger carrying on feeder lines, for sightseeing, for service on transport lines that do not require larger transport ships, and for aerial photography and mail and express transport.

The Kingbird is a high-wing, externally braced monoplane, the two Whirlwind engines being mounted in outboard nacelles located beneath the wings. The greater part of the structure is of aluminum alloy, heat-treated steel being used for the more heavily stressed members. The wing beams are constructed of dural tubes in the inner panels and welded steel tube trusses in the outer panels. The wing ribs are built up of dural tubes welded together. The fuselage is constructed of dural tubes riveted into dural and steel fittings at the junction points. The framework of the tail surfaces is made up of beams and ribs stamped from sheets of Alclad, an aluminum alloy designed to resist corrosion. A fin and rudder are placed in the slipstream of each propeller to give directional stability and control. The wings, fuselage and tail surfaces are covered with fabric. The engine nacelles are covered with removable dural cowling which has been provided to give accessibility to all parts of the power plant installation.

In the design of the cabin, provision has been made for the pilot's seat forward and on the left, adjacent to a seat for the co-pilot or passenger. Behind the pilot's compartment are seats for five passengers (and a removable seat for the sixth) arranged in two rows with the aisle between. Farther aft is a baggage compartment and a lavatory equipped with toilet and wash basin. The passenger seats are upholstered in leather and have high backs and box spring cushions. These chairs may be adjusted to a reclining position. The walls of the cabin are upholstered in leather up to the window line and in cloth above that point. Trimmings are in walnut and a carpet covers the floor. The windows are of non-shatterable glass and are fitted with roller shades. Ventilation and steam heat are provided, and the walls are insulated against cold and noise by a special material installed between the upholstery and outer covering.

The control column is of the single swing over wheel type, which is always clear of the front seat, not being used by the pilot at the controls. A side by side dual system for the other controls is used, the rudders being operated by pedals. The other seat in the pilot's compartment may be made available for a passenger by disconnecting the auxiliary pilot's rudder pedals. The elevators are actuated by push rods, the rudders by cables and the ailerons by cables running up to the wings and connecting with push-rods. The ailerons and rudders are balanced aerodynamically to give light loads on the controls.

Oleo-and-spring shock absorbers are installed on the main landing gear as well as on the tail wheel. Bendix brakes are used.

Specifications

Span	54 feet 6 inches
Length overall	34 feet 9.5 inches
Height overall	10 feet
Wing area (including ailerons)	405 sq. feet
Ailerons	54.2 square feet
Elevators	26 square feet
Rudders	20.2 square feet
Horizontal tail	65.4 feet
Vertical tail	28.9 square feet
Weight empty	3,824 pounds
Useful load	2,000 pounds
Payload with 120 pound baggage	970 pounds
Gross weight	5,824 pounds
Wing loading	14.32 pounds per sq. ft.
Power loading	12.88 pounds per h.p.

Performance

High speed	135 miles per hour
Cruising speed	115-120 miles per hour
Stalling speed	63.5 miles per hour
Rate of climb	900 feet per minute
Radius, full throttle	325 miles
Radius, cruising speed	442 miles
Service ceiling	14,700 feet
Absolute ceiling	16,500 feet
Climb, ten minutes	6,700 feet
Gasoline capacity	100 gallons

DOLLY FOR SIKORSKY S-38

AIR ASSOCIATES, INC., has developed and started production on a one-man dolly designed to facilitate the handling of the twin-engined amphibion plane manufactured by the Sikorsky Aircraft Corporation of Bridgeport, Conn. The dolly enables one man to move a Sikorsky plane in and out of the hangar without the help of the ground crew formerly necessary.

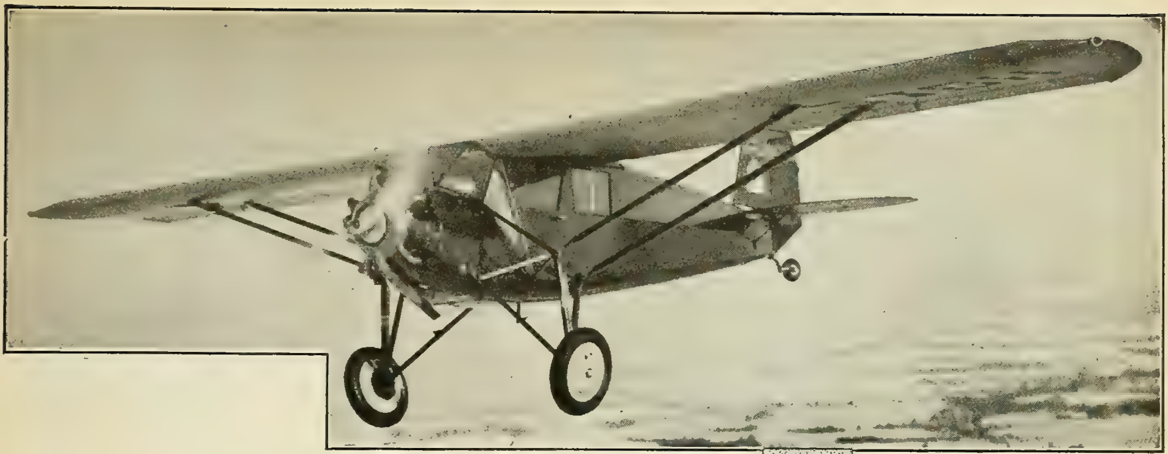
The dolly is comprised of a shoe and a lever arm. The shoe is attached to the tail skid and the lever arm is equipped with wheels and fittings which are attached to the shoe. The Sikorsky corporation has approved the dolly and has ordered several.

ANEMO TACHOMETER

THE O-Z Anemo Tachometer, an air velocity meter designed to show instantaneously the air velocity and its fluctuations in miles per hour and meters per second, has been developed by the O. Zernickow Company of New York City. The reading is practically unaffected by altitude or barometric pressure, according to the company, and can be used directly.

The air velocity meter is a combination of the Robinson Cup Cross and a centrifugal tachometer. When exposed to an air current the cup cross obtains an average angle velocity, the average absolute speed of the cup center being in approximately constant relation to the wind velocity. The result is transmitted to the hand of the instrument which indicates the wind velocity and its fluctuations on an accurate scale.

All working parts of the mechanism such as the ball-bearing spindle, pendulum and indicating apparatus are enclosed in a dust-proof aluminum housing, and the cross cups are protected by a wire guard. With the handle attached, the tachometer weighs two pounds. The dial has double graduations from ten to seventy miles per hour and five to thirty-five meters per second.



MANUFACTURING A COMPLETE LINE OF AIRCRAFT UNDER 6 APPROVED TYPE... CERTIFICATES.....

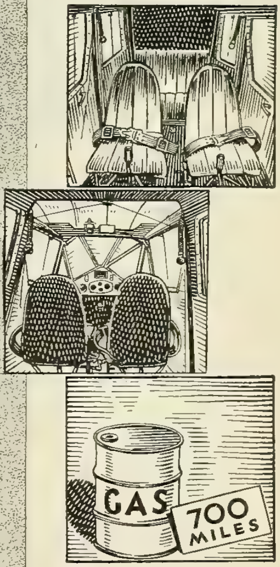
American Eagle's new four-place folding wing cabin monoplane, Model D-430, is the last word in aircraft! It is the roomiest, most comfortable four-place enclosed plane on the market.

With a 1,022-pound useful load, the plane develops 142½ miles an hour top speed and cruises at 115-120 miles an hour. It otherwise has exceptionally high performance.

Twenty-two and a half square feet of triplex glass gives utmost vision. There's no backseat riding with knees in the pilot's back. The American Eagle 430 is as roomy as your auto! Three doors, two forward and one right rear, offer additional convenience.

Powered with the Wright Whirlwind Five, the American Eagle 430 possesses exceptionally high performance. It is to be offered with motors ranging up to 225 horsepower.

This is an exceptionally fine airplane—and at a price which will prove unusually attractive. It will appeal to private owners; to operators and to business firms desiring to keep pace with the times in rapid transportation of their officials and representatives.



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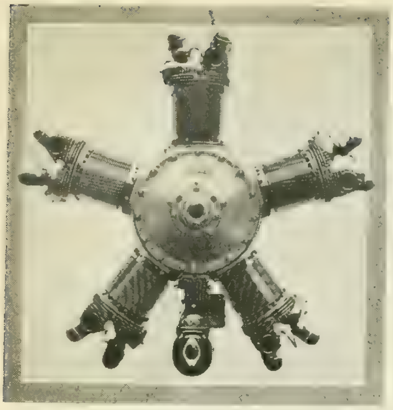


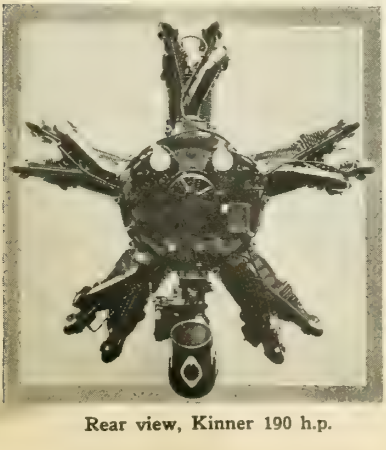
190-HORSEPOWER KINNER ENGINE

THE introduction of the new Kinner 190-horsepower five-cylinder air-cooled radial airplane engine, model R-715, which has been subjected to extensive durability tests, marks the entry of the Kinner Airplane and Motor Corporation into the higher power, small engine field. Heretofore, the Kinner corporation has devoted its production facilities to the 100-horsepower model.

The new model has a 715-cubic-inch piston displacement, has an overall diameter of fifty inches, and an overall length, without starter or generator, of less than thirty-five inches. It has substantially the same arrangement of parts as the smaller model engine, and has the same simplicity, smoothness of operation and forward visibility. It has less weight in proportion to its power than the smaller model, and has the added advantages of having provision for standard starters, electric generator and fuel pump. The weight dry—without hub, carburetor air heater, exhaust collector ring, starter, generator and fuel pump—is 415 pounds. The weight of the exhaust system, including the air heater, is forty pounds.

The airplanes which will be able to utilize the Kinner model R-715 engine will be of the larger sport, advanced training and four and five-passenger cabin types.

The simplicity of this engine is apparent when it is considered that there are only five cylinders, that the induction system is without superchargers or rotary induction, that accessories are driven by simple spur gears, that "plumbing" is held to a minimum, and that plain bearings are used throughout, excepting for the deep groove type ball thrust bearing. Smoothness of operation is attained by a specially developed precision method of balancing, by uniform power because of precision manufacture, and by good carburetion. This engine may be used either as a pusher or a tractor.



Rear view, Kinner 190 h.p.

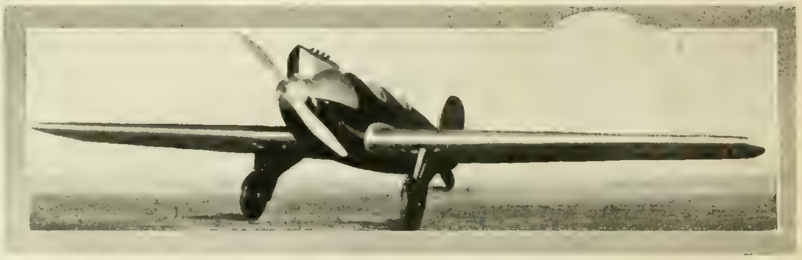
Provision has been made for the use of standard starters, such as Eclipse hand turning gear, inertia, hand, electric or combination starters, or standard aircraft electric starters. The provision of a standard drive for an electric generator affords the use of electric type starters, lighting system, radio, etc. Provision of fuel pump drives permits considerable latitude in location of fuel tanks. However, the Stromberg carburetor is located so that a simple gravity fuel system can be used. Two Scintilla magnetos provide ignition. The engine can be obtained with a nose type collector ring if so desired. The propeller end of the crankshaft is of No. 30 S. A. E. Standard.

The mounting bolt circle diameter is 19¼ inches. The diameter of cowl support on nose type exhaust collector ring is 25 inches. The total length without starter or generator is 34-13/16 inches. The length back of mounting with Eclipse electric inertia starter is 13⅝ inches. The distance from mount to the C. L. of the propeller is 23⅞ inches.

The Kinner Airplane & Motor Corporation is submitting the engine to the Department of Commerce to obtain an Approved Type Certificate. Tests to date indicate good "wide open throttle" durability, low fuel and oil consumption, easy controllability, as well as ready availability of its power.

Specifications

Rated horsepower	190 at 1,800 r.p.m.
Bore	5⅝ inches
Stroke	5¾ inches
Displacement	715 cubic inches
Compression ratio	5.3 to 1
Weight dry	415 pounds
Fuel consumption at 1,800 r.p.m.	0.60 lbs. per h.p. per hr.
Fuel consumption at 1,700 r.p.m.	0.50 lbs. per h.p. per hr.
Oil consumption	0.020 lbs. per h.p. per hr.
Overall diameter	50 inches



CAIRNS LOW-WING MONOPLANE

A TWO-PLACE open-cockpit monoplane powered with a DeHavilland Gipsy aircraft engine of 90-horsepower (produced by Wright Aeronautical Corp.) driving a Hamilton propeller with a 78-inch diameter has been produced by Cairns Aircraft of Naugatuck, Conn. This ship will be put in production with a universal engine mounting designed for an in-line power plant. Patents have been obtained and test-flights will be made by the Cairns company.

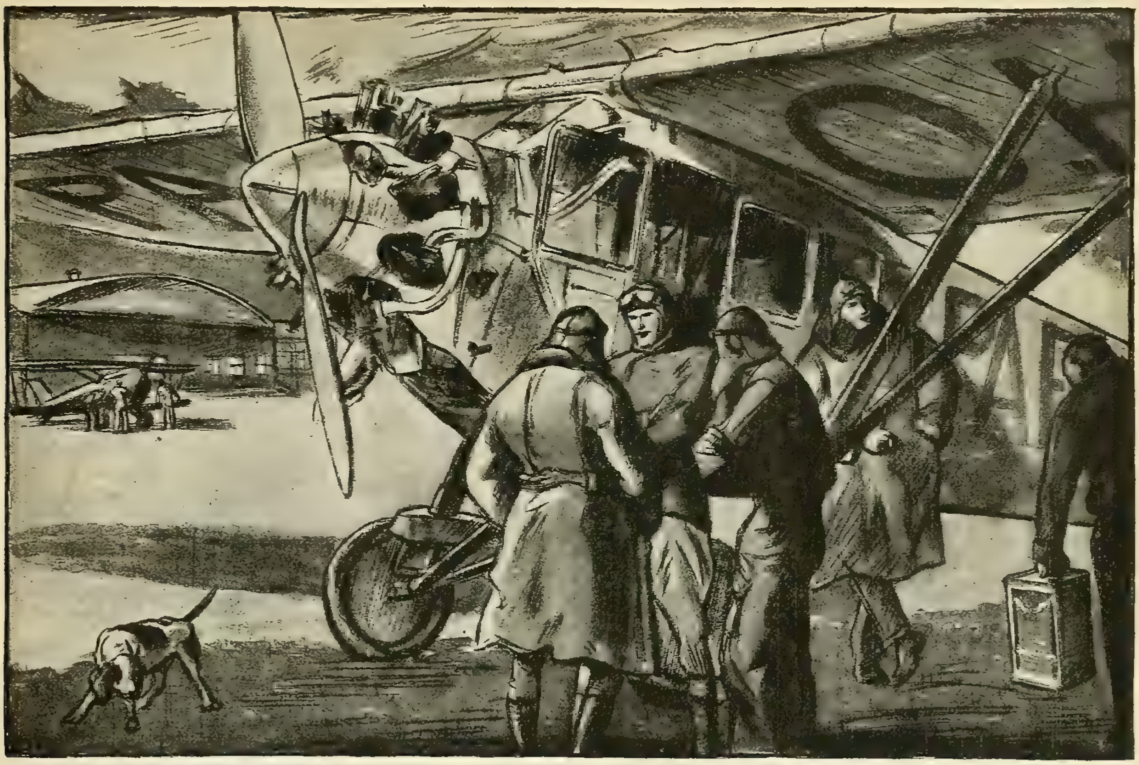
The pilot's seat is in the rear of the cockpit and is equipped with a seat mounted on shock absorbers and adjustable to any position. Seats are upholstered in blue morocco leather. The plane is equipped with dual controls and dual instrument panels. The push rod system of controls is provided, and no cables or wires are used. The ship is equipped with positive driven brakes which may be operated by either foot or both. The stabilizer is adjustable in flight, and the dihedral of the wings is adjustable on the ground. The wing curve is a double tapered Cairns No. 81. The ship is provided with a regulation landing gear including a tail wheel. The standard paint job will be a blue fuselage and aluminum wings with chromium trimmings.

Specifications

Span	35 feet
Length	22.5 feet
Height	8 feet
Weight empty	1,150 pounds
Weight loaded	2,000 pounds
Cruising radius	1,000 miles

THE PROPERTIES OF PETROLEUM PRODUCTS

IN Bureau of Standards Publication 97, by C. S. Cragoe, various thermal properties of petroleum products are given in numerous tables which embody the results of a critical study of the data in the literature, together with unpublished data obtained at the Bureau of Standards. The tables contain what appear to be the most reliable values at present available. The experimental basis for each table, and the agreement of the tabulated values with experimental results, are given. Accompanying each table is a statement regarding the estimated accuracy of the data and a practical example of the use of the data. The tables have been prepared in forms convenient for use in engineering.



GETTING OFF TO A GOOD START

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-TP- Oils are new—the latest development in scientific lubrication. They have been tested and approved by leading manufacturers of airplane engines and by many leading pilots. They are straight-run oils, not blended or compounded, produced from pure, paraffine-base crude by a process for which patents are pending.

This process has marked advantages over other methods. It removes all the paraffine wax, while preserving all the lubricating bodies in the crude. Elimination of the wax is responsible for its low cold test.

In terms of performance this means uniform viscosity at all working temperatures, minimum carbon deposit and ignition trouble from fouled spark plugs, easy cold priming, immediate oil pressure, perfect lubrication winter and summer, on the ground or at high altitudes—a maximum of safe flying hours.

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THE OGDEN
CIRRUS TRIMOTOR
"OSPREY"

THE Ogden Osprey is a six-place trimotor high-wing cabin monoplane powered with three American Cirrus engines rated at 95 horsepower at 2,100 revolutions per minute. This ship is manufactured by the Ogden Aeronautical Corporation of Inglewood, Calif.

One engine is mounted in the nose of the ship, the two outboard engines being mounted on nacelles. The engines are completely cowled in to decrease head resistance. The cowling is similar to that used on automobiles and facilitates the inspection and repair of the engines, it being necessary only to lift up either side of the hood for this purpose. The company has developed a system of cooling by means of which air is drawn in through an aperture directly behind the propeller on each engine, is deflected around each cylinder and drawn out through the louvres in the hood on the opposite side. On the exhausts of the outboard engines only the lips of the bayonet stack protrude through the cowling and these are flush with the surface to give a minimum resistance and increase the general streamlining effect. The engines are equipped with Eclipse hand turning gear starters.

The wings consist of a center section and two outer panels made up of spruce box spars and spruce ribs with plywood gussets. Compression members are of steel tubing. Two terneplate tanks of forty-five-gallon capacity each are located in the center section. The outer panels are braced with struts running from fittings in the engine nacelles. The ailerons extend practically the full length of the outer panels. The fuselage is constructed of welded chrome-molybdenum steel tubing braced by tubular diagonal members. The wings and the fuselage are covered with fabric. The tail surfaces are of chrome-molybdenum tubing and are fabric covered.

The cabin is thirteen feet in length and accommodates five passengers and a pilot. This compartment is sound-proofed and insulated by means of Dry-Zero blanket and Insulite sheet. Chairs are of steel construction, finished with wicker and leather, and are fastened in sockets fixed in the cross members of the fuselage, which are specially trussed for this purpose. At the rear of the cabin are located a wash room and an emergency exit. Shatter-proof glass is used throughout, and sliding windows are provided next to the two pilots' seats. A swing-over dep control is installed to provide controls for two pilots.

The type of brake system used eliminates the use of foot pedals other than the rudder pedals and makes it possible to steer the ship while on the ground. A hand brake is located between the two pilots' seats to give the desired tension in the brakes, this tension being transmitted proportionately to either or both wheels by working the regular pedals. When the rudder pedals are in neutral position both brakes are under equal tension and by moving either pedal a corresponding pull is put on the brakes to turn the ship.

Standard equipment includes altimeter, compass inclinometer, air speed indicator, three oil pressure gauges, three oil temperature gauges, three tachometers, three magneto switches, one master switch, navigation light switch, two gas gauges and gasoline shut-off cocks.

The master switch is mounted on the instrument board below the throttle control. A stabilizer adjustment knob and the gasoline shut-off cocks are located at the base of the panel. Auxiliary panels containing the tachometer, oil pressure and temperature gauges are mounted in the side of each engine nacelle within full view of the pilot.

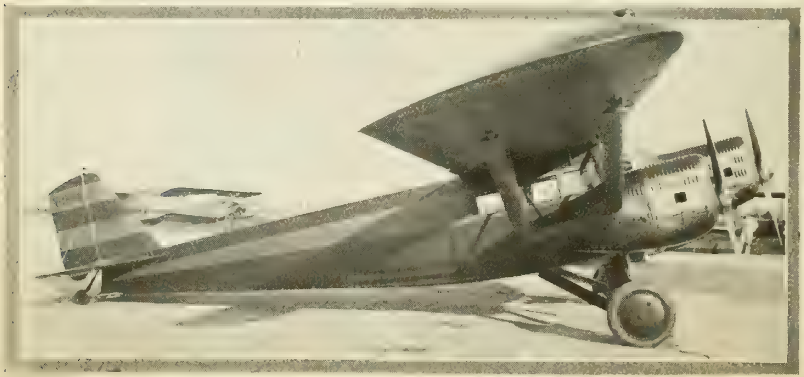
The landing gear has a tread of fourteen feet and Bendix wheels and brakes are used. Axles and radius rods are heat-treated and Oildraulic shock absorbers especially designed for the ship are provided. There is a tail wheel with pneumatic tire and Oildraulic strut provided in addition to a detachable handle for steering when taking the ship in or out of the hanger.

Specifications

Span	50 feet
Chord	7 feet
Length	34 feet 6 inches
Height	9 feet 3 inches
Wing area	312 square feet
Aileron area	26 square feet
Elevator area	17.5 square feet
Rudder area	9.5 square feet
Stabilizer area	23.5 square feet
Fin area	9 square feet
Weight empty	2,800 pounds
Weight loaded	4,500 pounds
Disposable load	1,700 pounds
Payload	950 pounds
Wing loading	14.4 pounds per square foot
Power loading	15.8 pounds per horsepower
Fuel capacity	90 gallons
Oil capacity (wet sump system),	14 pints per engine

Performance

High speed	125 miles per hour
Cruising speed	98 miles per hour
Cruising radius	550 miles
Landing speed	50 miles
Service ceiling	15,000 feet



Ogden Aeronautical Corporation's trimotor "Osprey" monoplane

AMERICAN HI-DRIVE ENSIGN ENGINE

THE American Hi-Drive Ensign, an air-cooled, four-cylinder-in-line airplane engine of inverted type has been announced by American Cirrus Engines, Inc., of Marysville, Mich., an associate company of Allied Motor Industries, Inc. This power plant weighs 273 pounds, and develops 95 horsepower at 2,100 r.p.m.

The American Hi-Drive Ensign permits the propeller shaft to be raised eight to eighteen inches above the shaft of a radial motor of similar power. The landing gear may be lowered an equal number of inches. The top of the engine is from six to twelve inches lower, and the area to be covered by cowling is reduced from an area of 6 to 11 square feet to 3.7 square feet.

Lubrication and fuel feed are obtained by complete force feeding of the power transmitting parts and permit the carburetor to be set twelve inches below the drive shaft instead of eleven inches above it, a gain for gravity feed of nearly two feet.

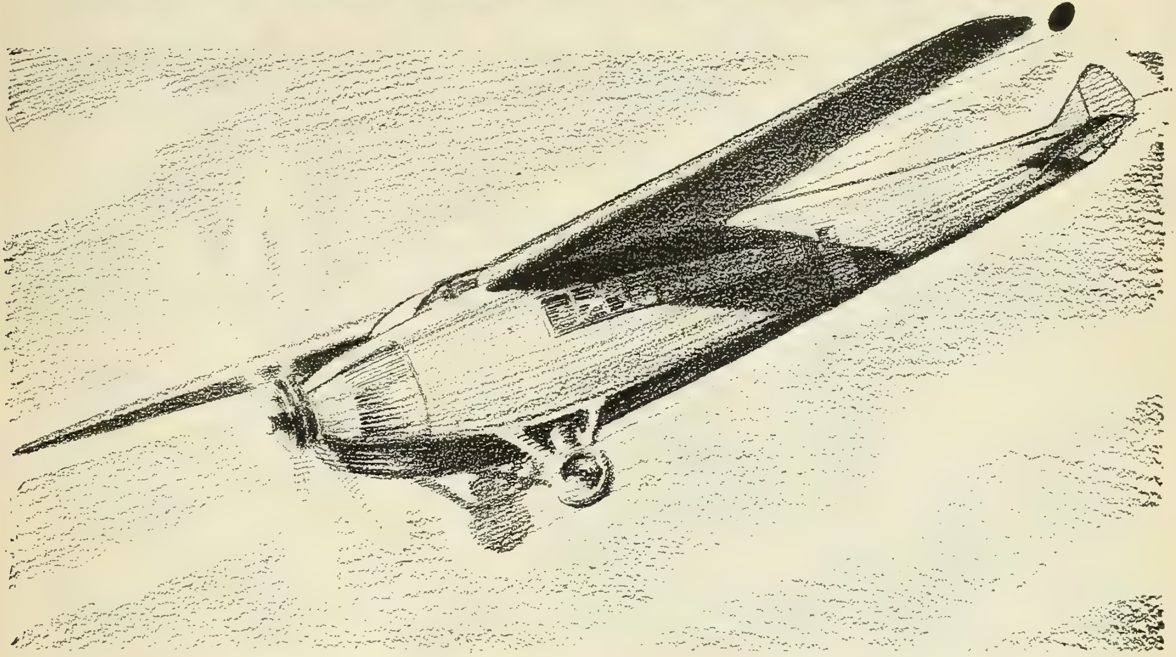
For cooling, clean air is taken in just below the propeller hub and, with proper cowling, is evenly distributed to all cylinders.

Connecting rods are made of forged, heat-treated aluminum alloy of large section. Babbitt-lined bronze bearings are used in the big end. Pistons are of aluminum alloy. Sizes of main bearings on the crankshaft are as follows: Crankshaft main bearings, 2 inches; crank pins, 1⅞ inches. There are four piston rings per cylcinder, including one at the skirt.

Specifications

Bore	4.330 inches.
Stroke	5.125 inches
Piston displacement	302 cubic inches
Compression ratio	5.4 to 1
Horsepower	95 at 2,100 r.p.m.
Weight (including propeller hub)	273 lbs.
Valve diameter (clear)	1.625 inches
Inlet valve lift	.417 inches
Exhaust valve lift	.445 inches

Endurance!



...depends largely on structure

IN a product where pre-determined reliability is so important as is the case with tubing for aircraft construction, it is necessary to surround its production with every safeguard for constantly maintaining that reliability; equal integrity of all tubing used, no matter how small the size or how short the piece may be, is, of course, prerequisite to safety in construction. National Tube Company is fully appreciative of this important phase of aircraft building, and both designers and builders may rightfully expect that the long experience, expert knowledge, skillful methods and selected materials used, enable this company to apply the principle of uniform quality to the highest degree in the production of NATIONAL-SHELBY Aircraft Tubing.

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THE AUDIO PILOTING SYSTEMS

THE Hanson audio piloting cable system for guiding blind aircraft to safe landings was announced by Earl C. Hanson, of Chicago, the inventor, at the Ford Transportation Exhibit in that city in January.

Previously, tests of the device were made at the Ford airport, Lansing, Ill. The development of the system was facilitated by the equipment placed at Hanson's disposal by the Ford Motor Company. Ford trimotor monoplanes, and the use of the company's airport at Lansing, were made avilable to him for the two years of experimentation.

Based upon the principles of electro-magnetic induction, the system provides for parallel cables radiating from the edges of flying fields, every other cable emitting a code in dots and the alternating cables a code in dashes. The code is picked up by a loop attached to the plane and made audible or visible to the pilot by the use of audion amplifier tubes.

An altitude checking ground antenna activates an electric altimeter which translates that intensity into actual height above the source or cable. Thus, if the loops are draped over high tension lines, poles, bridge heads, roofs or other ground obstructions the pilot receives an altitude reading which is exact from the height of that obstruction.

The altitude checking ground antenna equipment consists of a loop of buried cable several thousand feet long and 600 feet wide. A motor generator provides the alternating current for energizing the loop antennae. Since atmospheric conditions, or time of day or night, does not in any noticeable way affect the transmission of electro-magnetic wave energy emanating from the ground cable system, it is possible to obtain approximate height of aircraft above the ground pilot cable system.

The Department of Commerce, Bureau of Mines' report, November 1929, states that experiments based on the Hanson inventions conducted at Mammoth Cave show that the audio frequency electro-magnetic wave energy passes readily through 900 feet of continuous rock. Large bodies of salt water offer virtually no opposition to the transmission of the audio wave energy from submerged cables to marine vessels.

The following is a description of the simplest cable installtion for indicating entrance to one side of an irport:

Two closed loops of buried cable spreading from 200 feet near the entrance to the field to 1,000 feet across at the outer extreme form one complete dot-dash system. An alternating current generator is connected through constant energy regulating devices and a rotating contact breaker to each cable. The rotating contact breakers are arranged in suh a manner as to allow one cable to project an invisible beam of audio frequency wave directly above the cable system, the interruptions in the one cable forming dots and in the other dashes.

This system allows a pilot to know if he is going in a definite direction. His map of the airport would indicate the location of the cables in respect to the landing field. To indicate to the pilot the exact edge or entrance of the field, another loop, 600 feet long by several hundred feet wide, is positioned at the entrance and at right angles to the entrance cable loops and connected directly to the generator. No rotating contact breaker or interrupter is used in this circuit, though a constant energy regulating device is required.

A more elaborate airport installation would consist of several of the units mentioned in order that a plane could approach a field in a direction best suited to the weather conditions prevailing. A directional signal, to indicate compass points, might be transmitted from the dash guiding cables spaced with pauses to indicate the cardinal points.

The most elaborate and the most practical system, if cost of installation were not important, would be to use a high power electric generating phonograph to energize the "gun coil," the coil positioned at the edge of the field, and give the name of the airport and its position on the compass. Voice and music transmission at audio frequency have been tried at the Ford airport and proved successful. By use of special relays, a row of vertically placed electric lights could be used to indicate general height of aircraft above the altitude ground cable loops.

Receiving equipment for aircraft may be of several kinds. For small private craft there may be loop antenna comprising thousands of turns of a fine copper magnet wire, enclosed in a water-proof bakelite case approximately fourteen inches in diameter and two inches thick. A small water-proof flexible cable would connect the loop antenna to the input of a three-stage audio frequency audion amplifier. This amplifier greatly increases the strength of the audio frequency signals received wirelessly from the electrically energized cable system located on the ground. With slight modification, the present aircraft radio receiving set could be employed.

Either head phones or a calibrated electric meter may be used. As a plane descends over the electrically energized ground cable system the electro-magnetic wave energy intercepted by the loop antenna increases. This amplifier energy actuates the meter causing the needles to indicate to the pilot that the craft is reaching a point a definite distance from the ground. The head phones may be used in conjunction with the visual indicating meter.

For passenger planes the loop antenna is mounted within the metal wings, as was the case with the Fords used in flight tests, and placed several feet from the wing tips. To prevent absorption of the electro-magnetic wave energy, non-metallic material such as laminated micarta, may be employed. The multiple stage audion amplifier may be located in any convenient part of the craft.

DATA ON COMMONLY USED WING SECTIONS

REPORT No. 331 was prepared by F. A. Louden at the request of National Advisory Committee for Aeronautics in the Bureau of Aeronautics, Navy Department, in order to group in a uniform manner the aerodynamic properties of commonly used wing sections as determined from tests in various wind tunnels. The data have been collected from reports of a number of laboratories. Where necessary, transformation has been made to the absolute system of coefficients and tunnel wall interference corrections have been applied. Tables and graphs present the data in the various forms useful to the engineer in the selection of a wing section. Report No. 331 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

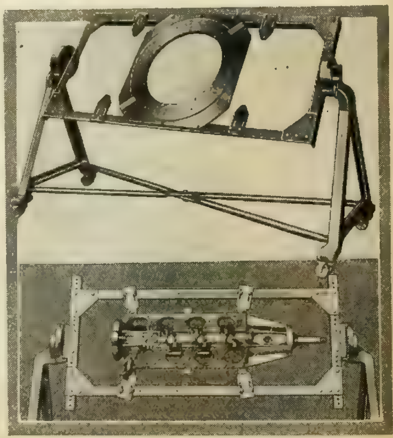
LIPE MOTOR STAND

A NEW piece of equipment intended to speed up the work of overhauling aircraft engines is the Lipe Airplane Motor Stand. This stand holds any type or size of engine rigidly in place in a favorable position for working. All types of engines are handled by this stand, such as in-line, V-type and radial engines varying in size from 60 to 600 horsepower.

The frame is easily adjustable for width and length. It can be revolved in a complete circle in either direction and may be locked in any position desired by means of a hand clamp.

Diagonal leg braces provide unobstructed standing room. The stand is mounted on double swivel casters with ball bearings so that it can be moved from place to place even when bearing an engine.

Standard equipment includes one rotating adapter ring for any specified radial type engine. This rotating ring permits the engine to be revolved on two axes and clamped in any desired position. In addition, brackets are provided for in-line and V-type engines. These brackets are slotted to permit accurate adjustments at any angle. Additional adapter rings for other radial motors can be supplied.



The Lipe airplane motor stand

New Low Prices!

Inland Supersport with Warner Scarab Motor

$4,985

Inland Sport with LeBlond "60" Motor

$3,485

A thousand dollar price reduction on the Inland Supersport is the month's best news! Now you can own this speedy little ship for less than five thousand dollars . . . fly it as economically as you can run a motor car.

Inland Sport is "tomorrow's plane today"—an airworthy ship of outstanding performance, with an American altitude record and the world's speed record for light aircraft already to its credit.

Inland Sport pioneered side-by-side seating to bring greater comfort and the pleasure of human companionship to open cockpit flying. Pilot and passenger can talk face-to-face . . . discuss maps, controls, instruments . . . converse almost as easily as in a motor car. This arrangement is a decided advantage in training, with instructor and student seated side-by-side.

Further details gladly sent on request.

INLAND AVIATION COMPANY

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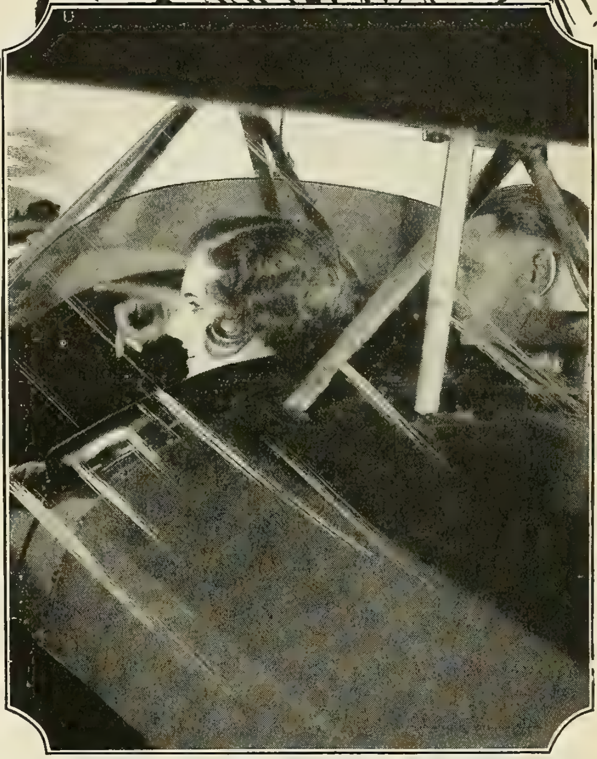
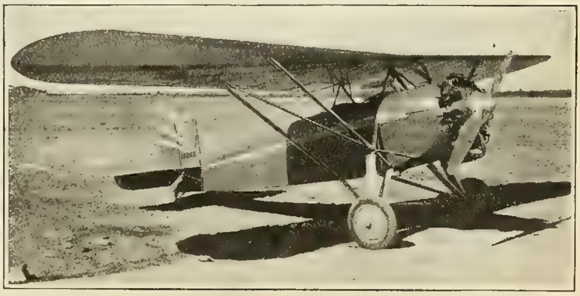


INLAND SPORT

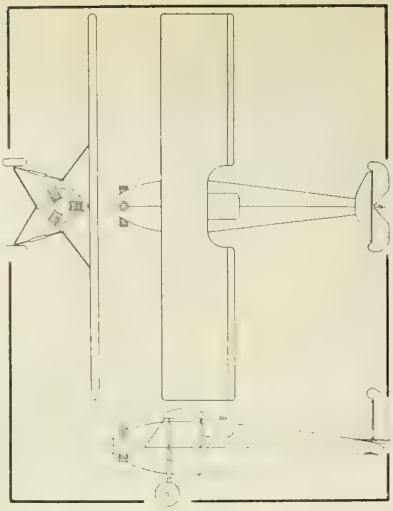
MONOPLANE

"TOMORROW'S PLANE TODAY"

Manufactured at Fairfax Field under Approved Type Certificate No. 259



THE PREST BABY PURSUIT



THE design of the Prest Baby Pursuit, a semi-cantilever monoplane produced in Arlington, Calif., by Prest Airplane and Motors, incorporates an unusual arrangement of the fuselage. To permit fastening the wing directly to the top corner of the fuselage just above the level of the pilot's eyes, resulting in the minimum obstruction to vision, the fuselage is turned up on edge. The pilot has normal vision forward, downward and above. In the construction of the fuselage, major stresses are distributed to the entire structure directly from the attached fittings. The plane is powered with Szekely SR-3 40-horsepower engine.

The wing is semi-cantilever, with solid and laminated spruce beams of full length pieces, with no splices in the one-piece wing. This spruce is known as Split-Rite and is marketed by the Aircraft Lumber Corporation of St. Paul, Minn. The fuselage is covered with A&N Nashawena fabric. The wing is covered with Flightex.

Internal drag struts are of chrome-molybdenum steel tubing, welded into a truss and bolted to the beams. The drag bracing is double and is of round Macwhyte tie rods with Safe Lock fittings. Chrome-molybdenum is used throughout in the construction, including sheet fittings and tubing. The fuel tanks are of aluminum, pickled and vibration-tested according to Navy specifications. The landing gear is fitted with Gruss Air Struts. A Consolidated instrument panel is provided.

The ailerons are controlled by means of cables within the wing and a push-pull tube to the wing from the torque tube. The wing may be removed without loosening the cables or pulleys, one pin being pulled to disconnect the ailerons. The wing is designed to be removed by two men in approximately ten minutes.

The ailerons extend the full length of the trailing edge and have a chord of 4¼ inches, their total area being 6.5 square feet.

The entire ship is constructed on a jig, and all of the parts are interchangeable with equivalent parts. The construction of the fuselage facilitates manufacture in jigs, and it is designed to come from the jig in alignment so that the landing gear, wings and other parts may be fastened without fitting or forcing.

Specifications

Span	24 feet
Chord	49 inches
Wing area	92 square feet
Length	17 feet 11 inches
Weight, fully equipped	475 pounds
Useful load	225 pounds
Weight loaded	700 pounds
High speed	90 miles per hour
Stalling speed	40 miles per hour
Climb, first minute	700 feet

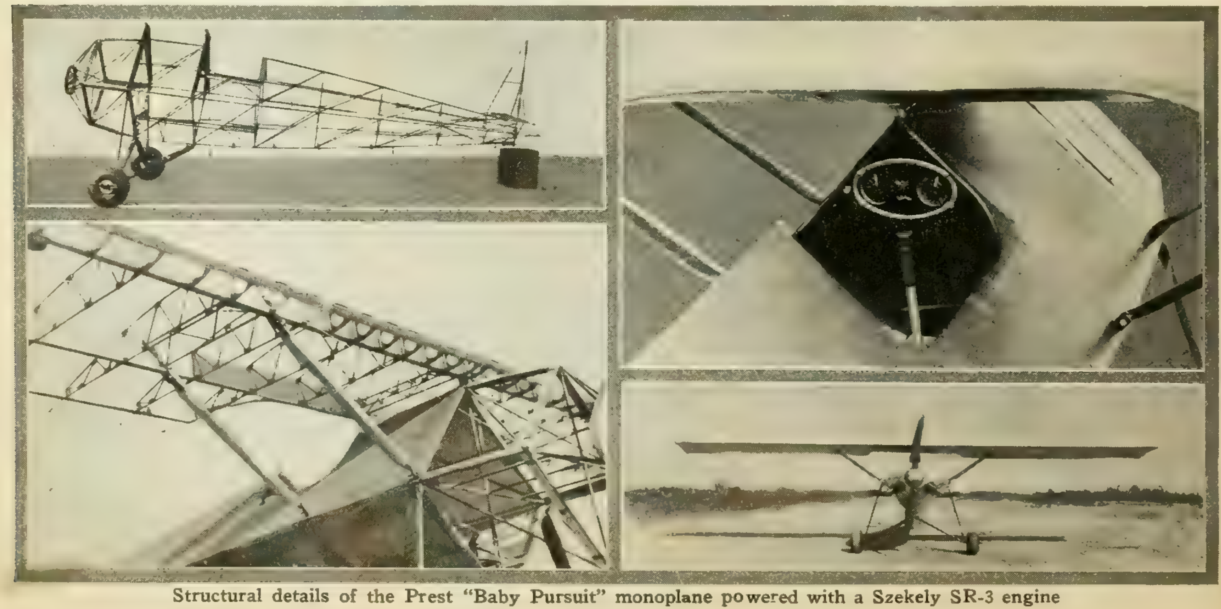
AERODYNAMIC THEORY AND TEST OF STRUT FORMS

AERODYNAMIC Theory and Test of Strut Forms (II), submitted by R. H. Smith to the National Advisory Committee for Aeronautics for publication and printed in Report 335, presents the second of two studies under the same title. In this part five theoretical struts are developed from distributed sources and sinks, and constructed for pressure and resistance tests in a wind tunnel. The surface pressure for symmetrical inviscid flow are computed for each strut from theory and compared with those found by experiment. The theoretical and experimental pressures are found to agree quantitatively near the bow, only qualitatively over the suction range, the experimental suctions being uniformly a little low, and not at all near the stern.

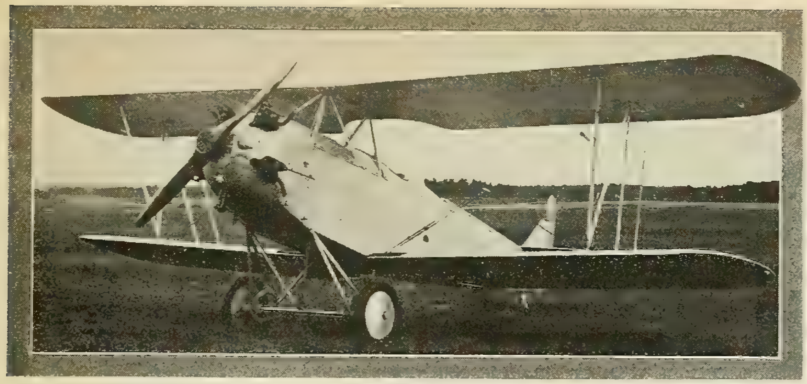
This study is the strut sequel to Fuhrmann's research on airship forms, the one being a study in two dimensions, the other in three. A comparison of results indicates that the agreement between theory and experiment is somewhate better for bodies of revolution than for cylinders when both are shaped for slight resistance. The consistent deficiency of the experimntal suctions which is found *in* the case of struts was not found in the case of airships, for which the experimental suctions were sometimes above, sometimes below, their theoretical values.

Along with these five theoretical struts were made three empirical struts of high repute, the British strut given in Reports and Memoranda 183, the German strut No. 53, and the United States Navy No. 2, and all eight tested for total resistance. Of the five theoretical struts, No. I excels as a fairing, No. V as a strut. No. V and the United States Navy No. 2 have about equal merit as struts, with the German No. 53 a close second and the British a poor third, the relative merits being 100, 103, and 112, respectively, of Reynolds Number $12\text{x}10^4$.

Report No. 335 may be obtained upon request from the N.A.C.A., Washington, D. C.



Structural details of the Prest "Baby Pursuit" monoplane powered with a Szekely SR-3 engine



SWEDISH "FALCON" PLANE

THE Svenska Falken (Falcon), a two-place biplane developed by the Svenska Aero A. B., of Stockholm, Sweden, was designed as a primary training plane when fitted with an Armstrong-Siddeley Mongoose engine of 135 horsepower, and as an advanced training ship when powered with an Armstrong-Siddeley Lynx engine of 200 horepower. Any type engine with a horsepower rated between 135 and 200 may be mounted in the Falcon.

The wings are staggered, the top wing being supported above the fuselage by inverted V cabane struts. There is one set of N inter-plane struts on each side of the fuselage. The wing structure is of Swedish steel covered with fabric, the edges of the wings being of wood or steel as desired. The fuselage is constructed of welded steel tubing covered with aluminum and fabric.

The ship is equipped with dual controls for the purpose of primary training. When the plane is fitted for advanced training work, the controls are either retained in both cockpits and the aft cockpit covered for training in blind flying, or the rear controls are removed and the aft cockpit equipped with a flexible gun mounting. Both cockpits are equipped with standard flight instruments, arranged identically on each instrument board, so that if the pilot changes his seat he will have the same set of instruments before him arranged in the same position. All controls are of steel.

The tail surfaces of the Svenska Falcon are of the conventional type, constructed of welded steel tube framework.

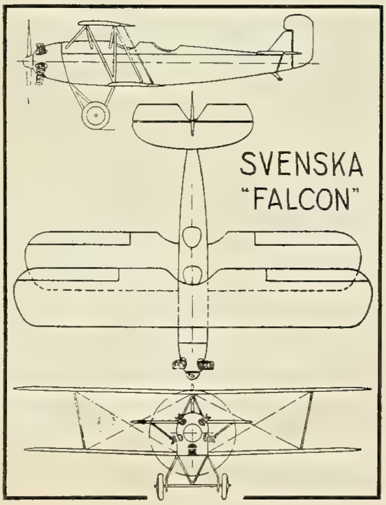
Elevators are unbalanced and the rudder is balanced. The landing gear is of the cross-axle type, supported by V-struts to the fuselage, at a point forward of the leading edge of the lower wing.

The engine is mounted to the fuselage by means of four bolts. There is an insulating wall of steel and asbestos between the power plant and the gasoline tanks, the latter being located in the fuselage forward of the front cockpit and under the top wing. The primary training ship carries fuel sufficient for four and a half hours' flight; the advanced training plane carries sufficient fuel for a flight of three and a half hours. Both planes are provided with an emergency gasoline tank which supplies fuel tor a half-hour flight. All tubing in the feed system is flexible and made of petroflex, an alloy developed to withstand engine vibration. The Svenska Falcon is designed for either commercial or military student training.

Specifications

(135-horsepower Mongoose Engine)

Span (top)	30 feet 7 inches
Span (lower)	28 feet 9.5 inches
Chord (top)	5 feet
Chord (lower)	5 feet
Wing area	272 square feet
Length overall	24 feet 6 inches
Height overall	9 feet 4 inches
Weight empty	1,322 pounds
Disposable load	660 pounds
Gross weight loaded	1,982 pounds
Wing loading	7.28 pounds per square feet
Power loading	14.7 pounds per horsepower
High speed	109 miles per hour
Landing speed	46.6 miles per hour
Climb to 3,000 feet	4.5 minutes



Outlines of the "Falcon"

WELDING TESTS

THE Air Corps at Wright Field has a test for qualifying welders. It consists of the manufacture of three types of joints—a plain butt weld, a fish-mouth weld, and a combination sheet and tubular joint. The welds are made by the welder without instruction from any other person. Standard welding apparatus is used and the work is performed under the conditions prevailing in the shop. The welding rod is selected by the welder. Add adjustments of the welding apparatus, such as selection of the correct tip, adjusting the pressures of the oxygen and acetylene, and determining the quality of the flame, are done by the welder. The material used in the joints conforms in chemical analysis and physical properties to that used in the regular production work. The test specimens are generally selected from tubing with a wall thickness of from 0.031 to 0.063 of an inch. The thickness of the sheet for the combination joint is selected so that it is at least four times the thickness of the tube to which it is welded. Each welder makes two plain butt and two fish-mouth welds and one combination weld. The welds are tested in direct tension until failure occurs. The combination weld is gripped by the sheet metal lug and the middle tube. In order to qualify as a welder of airplane parts, the welder must complete all test specimens in a workmanlike manner and the tensile strengths of the joints must be equal to or above the established minimum values. These values will depend upon the properties of the base metal. The test is accompanied by a certificate giving a statement of the welder's experience and the results of the tests on the joints.

Side view of the Swedish "Falcon" two-place training plane

Machined Parts Inspection
Electric Run-In Stands
Final Assembly
Sub-Assembly and Parts Fitting Department
Final Tear-Down and Inspection Department
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PLANT FACILITIES & EQUIPMENT

We are, and we believe with the very best of reasons, exceedingly proud of the very excellent facilities for production afforded in the home of the Warner Scarab Series 30, and the Warner Scarab Junior.

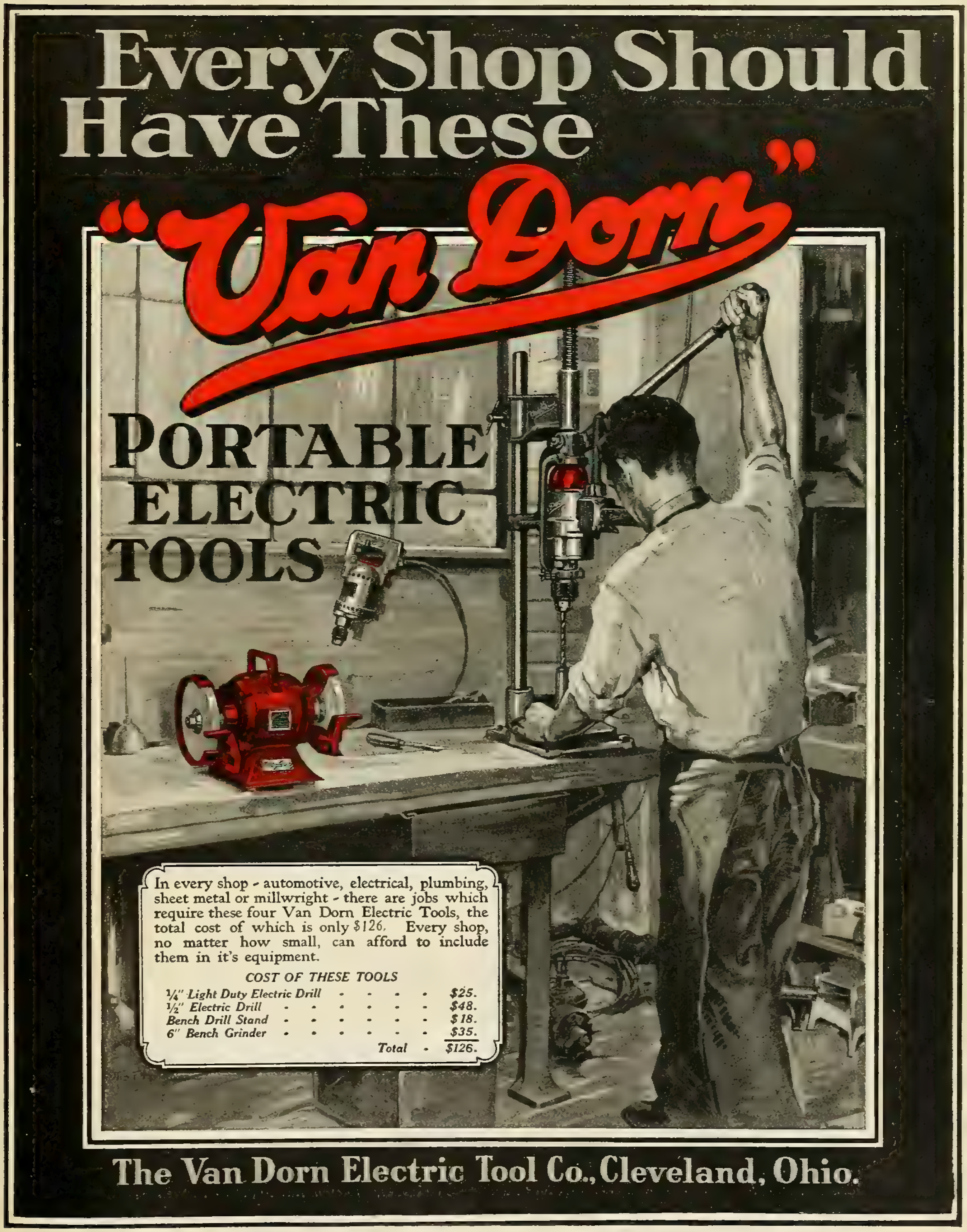
From the rough casting inspection through the various processes of machining, fitting, assembling, on through to the electric motor run-in stands and the test sheds with their laboratory equipment of the most recent design, no step has been overlooked that will assure the very finest kind of performance in these Warner engines.

The new Warner Junior 5 Cylinder engine just announced, will, we confidently believe, equal in its sphere the very valuable contributions already made to American Aircraft history by the Warner Series 30, Seven Cylinder.

Pamphlets illustrating both of these and giving their structural details at considerable length are available. Write for them.

WARNER AIRCRAFT CORPORATION
DETROIT, MICHIGAN

WARNER "Scarab" ENGINES


Every Shop Should Have These
"Van Dorn"
PORTABLE ELECTRIC TOOLS
The Van Dorn Electric Tool Co., Cleveland, Ohio.

In every shop - automotive, electrical, plumbing, sheet metal or millwright - there are jobs which require these four Van Dorn Electric Tools, the total cost of which is only $126. Every shop, no matter how small, can afford to include them in it's equipment.

COST OF THESE TOOLS

¼" Light Duty Electric Drill	*$25.*
½" Electric Drill	*$48.*
Bench Drill Stand	*$18.*
6" Bench Grinder	*$35.*
Total	*$126.*

STUDENT PRINCE BIPLANE

A NEW two-place sport and training biplane for private fliers and aviation schools is the Student Prince, manufactured by the Aircraft Builders Corporation of Portland, Oregon, a subsidiary of the First National Flying System. Officials of the company plan an immediate production of 100 planes. The factory is to be located in a central position in Oregon. J. Kegerreis is the general manager. E. S. Gooden, formerly with General Motors, will have charge of the factory and production. Lieutenant Basil B. Smith will be the chief engineer and test pilot, and Dr. Alexander Klemin, of the Daniel Guggenheim School of Aeronautics at New York University, will be retained as consulting engineer.

The sales organization of the new company will be built up from the aviation schools using the Rankin System of Flying Instruction. The Rankin company is also a subsidiary of the First National Flying System.

There are three principal features incorporated into the ship intended to increase the safety of its operation. The large tail surfaces tend to reduce the probability of ground looping and provide more positive control; the center section has been cut away to allow better visibility; and a specially worked out oleo shock absorber is fitted to the landing gear to minimize the hazards of rough landings. In the case of the latter, the cylinders in the two oleo struts contain springs. There is a seven-inch travel in the struts and a four-inch travel in the tail skid shock absorbing unit. As soon as the wheels leave the ground in taking off, a check valve drops the oil back into the pressure cylinder of the shock absorber strut. The tread of the landing gear is approximately seven feet three inches. The wheels are visible from both cockpits.

The Clark Y airfoil section is employed for both wings. The wings are made up of two spruce spars between steel compression ribs, manufactured by the Aerotruss Manufacturing Company of Los Angeles. They consist of rolled channel steel, 15/1000 and 10/1000 inch in thickness and made into Warren truss ribs. Cadmium plating is used to prevent corrosion. Each rib weighs 7/10 pound. It has been tested by the Department of Commerce to stand 500 pounds in distributed load. Ribs are tacked to the spars on the leading edge with the conventional drag wires between.

Ailerons are 15 inches wide and extend for 10 feet on each side of the lower wing only. They are hinged at the top with individual hinges on each rib, and are controlled by the combination of a torque tube and a crank.

The 35-gallon gasoline tank is in the center section, which is cut away for visibility. A handle is located above the front cockpit in this section so that the occupant can pull himself out quickly. The wings are detachable.

Welded steel tubing of 1025 SAE specification is used in the construction of the fuselage. It varies between ⅝ and ⅞ inch in diameter. The Warren truss system of bracing is used throughout. The weight of the fuselage and tail surfaces, including the motor mount, and exclusive of the landing gear, is 110 pounds.

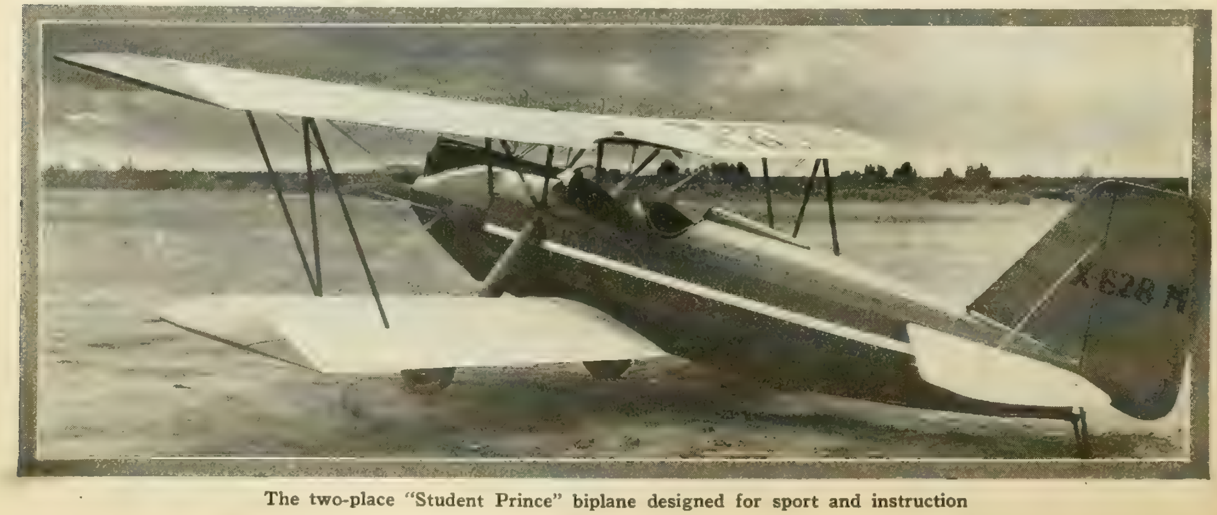
The tail surfaces are constructed of chrome-molybdenum tubing of varying thicknesses. The rudder, which has larger surface, has a wide 20-degree arc and is hinged to the tail post. The stabilizers, with an area of 16.75 square feet, are adjustable on the ground. There are ten adjustments through an arc of four degrees, on a gusset plate welded to the fuselage, with a cap screw connecting with a lip on the stabilizer.

Separate push-pull tubes are used to control each elevator. These are operated from a ball and socket joint on the crank in the back part of the fuselage. There are rudder pedals in each cockpit. Standard equipment includes a Davis safety control stick, which consists of a split length arrangement which can be released instantly by the pilot by means of a cable near his own stick. Jerking the cable disconnects the top of the student's stick.

The two cockpits are upholstered in leather with rubber foam padding. The seats are made of aluminum and are adjustable to provide maximum visibility. A full set of Consolidated instruments, including a compass, tachometer, oil temperature and pressure gauges, and an air speed indicator, is standard equipment. A baggage compartment large enough for two suitcases is located in front of the forward cockpit. It is reached by a small hatch in the top of the cowling.

The fuselage and wings are covered by grade A cotton fabric with the conventional double weave. That on the wings is sewed in one piece and then drawn on like a sock before being stitched to the ribs.

Standard wire-spoked disc wheels are used with aluminum discs for streamlining.



The two-place "Student Prince" biplane designed for sport and instruction

Streamlining of the front cowling and the struts is patterned after the Navy strut number one modified, or the Navy strut number two.

Designers of the plane were able to provide good streamlining through the use of the 95 horsepower Cirrus Mark III engine. The exhaust pipe runs down through the fuselage between the engine and the fire wall, and has an exit in the middle of the fuselage on the under side of the cowling.

The ship has not been designed to be a pursuit plane in any sense of the word. Emphasis has been placed on safety and performance appropriate to student and sport flying.

Specifications

Length overall	23 feet 6 inches
Height overall	8 feet 10 inches
Span, upper	30 feet 3 inches
Span, lower	27 feet 5 inches
Chord, upper	55 inches
Chord, lower	55 inches
Stagger	28 degrees
Incidence	none
Gap	4 feet 8 inches
Wing area (including ailerons)	240 square feet
Aileron area	22.5 square feet
Stabilizer area	16.75 square feet
Elevator area	12.85 square feet
Fin area	4.4 square feet
Rudder area	8.8 square feet
Weight empty	825 pounds
Useful load	585 pounds
Pilot and passenger	330 pounds
Fuel	200 pounds
Oil	30 pounds
Tools, etc.	35 pounds
Gross weight loaded	1,410 pounds
High speed	110 miles per hour
Landing speed	37 miles per hour
Cruising speed	85 miles per hour
Initial rate of climb	1,200 feet per minute
Absolute ceiling	20,000 feet
Service ceiling	15,000 feet
Cruising radius	500 miles

BALSA WOOD

By James T. Downey

Vice President, Balsa Wood Company

LATA BALSA WOOD is used by the aircraft industry to obtain a very necessary result—strength with lightness. There are a number of uses for the wood. The important ones are as follows: streamlining, sound deadening, insulation, filler, and to some extent structures. These uses are described below in their stated order.

In the designing of planes, it is desirable that streamlined forms be used wherever possible. Designers were originally confronted with a problem in the use of round steel tubes for struts, since tubes offer considerable wind resistance. To reduce this, experiments were made with workable materials, particularly spruce. In the case of spruce, entirely too much weight was added.

Balsa is very suitable for this purpose because it is workable and because it is light, which makes possible the creation of a streamline shape with hardly any increase in weight.

Balsa is cut and shaped so that it fits snugly around the tube. Then the wood is wrapped with linen to keep it in place around the tubing. Shock absorber units are also streamlined this way. In many cases, the streamlining of round tubes as outlined above shows an increased speed of fifteen per cent. The weight of balsa is approximately six pounds per cubic foot.

The elimination of vibration and sound have long presented a problem in the design of airplane cabins. Many types of materials possessing insulating value were experimented with to overcome this condition. Because of the extreme porosity of balsa wood, it naturally offers qualities that would prove valuable for this purpose. Tests were made which indicated that, not only does it function as an insulator, but materially reduces vibration.

Unlike some other materials which are recommended for this purpose, Balsa has structural strength. Panels of various thickness are constructed of balsa, in some cases with three ¼-inch cores, cross banded with a hard wood veneer facing. These veneers may be of maple, birch or mahogany. They likewise can be supplied with a metal veneer.

The efficiency of balsa as an insulator and isolator depends upon the thickness of the core. These panels are used as floor boards, bulkheads, partitions, doors and for interior panels for cabin planes. Balsa is also practical as a housing around the fuel and oil pump and feed lines, having insulating value necessary to keep the fuel and oil at a uniform temperature.

There are many parts in the fuselage where a filling material is required so that the shape will be retained permanently. In these places, balsa is shaped to fit the space and inserted. Balsa is easily turned on a lathe, and these turnings are used to fill very thin metal tubing to prevent it from crushing. By doing this, instead of using tubing which would have sufficient strength without the filler of balsa, a saving in weight results.

Balsa makes a good auxiliary compression spar for wing construction. The size of a main compression spar of spruce can be cut down resulting in a weight saving. Balsa core compression ribs also save weight. Gussets of balsa are used to keep the ribs square with spars. Balsa is also used on leading edges of wings and ailerons.

Lata Balsa Wood laminated propellers, approximately 20 feet in diameter, have been made and experimented with by the U. S. Army. However, it is not a practical propeller for the present types of airplanes, because the distance of the nose of the plane from the ground is not great enough to allow the propeller to clear it.

Balsa Wood Technical Data:

Weight per cubic foot	6-7 pounds
Modulus of Rupture (strength in bending)	2,100 pounds per square inch
Crushing strength (load parallel to grain)	2,050 pounds per square inch
Compressive strength (load perpendicular to grain)	110 yield point
Shearing strength	300 pounds per square inch
Tensile strength	4,000 pounds per square inch
Thermal conductivity	0.31

B.T.U. per hour per square foot per inch thickness per degree Fahrenheit change.

LIGHTNING TESTS ON THE BARLING NB-3

WHAT effects a stroke of lightning will have on an all-metal airplane comprise one of the many things that experimental laboratories, Government authorities and the industry are seeking to learn. Tests made on the Barling NB-3 monoplane manufactured by the Nicholas-Beazley Airplane Company, Inc., of Marshall, Mo., indicate that no damage results. At the laboratories of the Ohio Insulator Company, at Akron, extensive tests in this line are being made. The apparatus used is especially built to simulate as nearly as possible the exact results of natural lightning. The NB-3 with the engine running was so revolved and turned as to be struck at various points and different angles, and subjected to the tearing force and splintering shocks of strokes presumably the same as might happen naturally when flying through clouds of a thunder storm.

A series of discharges varying from 1,000,000 to 2,000,000 volts has been used. Tests will be continued to determine if such a plane can be seriously damaged by lightning, and if so, what preventive measures can be adopted. It is expected that these tests when completed may help to clear up the mystery of several serious accidents.

The Barling NB-3 low-wing monoplane of all-metal internal structure

AIRCRAFT

LANDING

Popular with aircraft manufacturers and pilots because of their inherent strength designed in by men who know aeronautical requirements.

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KELSEY-HAYES

WHEELS

AIRPORT AND AIRWAY

News of airlines, airports, and airways; radio, lighting and other auxiliary services

By

Kent Sagendorph

Omaha and the Airport Situation

ABANDONING the pessimistic sentiments noted last month, we are pleased to report that the chaotic airport situation at Omaha shows signs of solution. The city had voted a substantial appropriation for an airport at Cornish Park, but was balked by the park commissioner, who refused to cut the trees on the property, claiming it was a violation of the deed of gift. As the months went by and nothing was done, Council Bluffs, across the river, went ahead at a rapid pace in the development of its municipal port in an attempt to attract Boeing and other large aviation interests. The Omaha appropriation melted away with nothing but delays and newspaper arguments to show for the money expended.

Now comes word that a new project has been developed and a million dollars for development promised by influential citizens. The Cornish Park site will be abandoned to the park commissioner and his cottonwood trees, and the new "Port of Omaha" will be created near Bellevue, six miles south of the city. Work will begin as soon as the frost is out of the soil, and the site has been given by the enterprising citizens, while the cost of construction will be borne by "a nationally known air transport company." Those who doubt that this means Boeing will please consult the nearest psychiatrist.

Present plans call for runways of 3,000 feet each, to be paved with Tarvia and cement. Sponsors of the "Port of Omaha" project declare its location ideal; it is accessible to electric trolley cars, railway and automobile traffic and the short distance from Omaha's business center will tend to increase the business value of the field. A school of aviation is being organized to operate on the western section of the airport, while the eastern half will be reserved for transport operations.

While all this activity was in progress, backers of the Omaha Municipal Airport were still trying to clear up the present deadlock with the park commissioner. They plan to extend the runways, put in a new drainage system and make several other improvements, and Commissioner Noyes has been considering the purchase of 200 additional acres of land. The trees, however, remain, and as long as they thrust their leafy branches above the valuable landing area at the edge of the field, Boeing and other operators are well satisfied to assist with the development of the new port. Boeing is to have its port, the commissioner is to have his trees, and everybody is happy.

Col. Dunwoody on Air Transport

"WHAT are aviation's greatest needs for 1930?" asks Col. Halsey Dunwoody, executive vice president of the Universal Division of the American Airways, Inc., the airline operating subsidiary of the Aviation Corporation.

After asking what are the greatest aviation needs for 1930, Col. Dunwoody states he believes the seven greatest needs are as follows:

1. Air transport is a business and must be conducted on a strictly business basis. It must be measured with the same yardstick as that used in measuring other established industries.

2. Air travel has a definite value as a utility and must be sold on this basis if dividends are to be expected. (I think the Colonel means must be *advertised* or *represented to the public* on this basis.)

3. Federal, State and municipal aid in the creation and development of airports along the lines of our national and State highway systems.

4. The perfection of two-way radio and the organization and consolidation of radio development.

5. The evolution of equipment which will carry at least forty per cent more passengers, at today's cost per mile of operations.

6. A definite decision as to the dividing line between volume of traffic and revenue cost.

7. A development of an original sales plan for the sale of airplanes.

"Our problems," remarks the Colonel, "which have seemed so intricate at the moment, have been but the natural inhibitions of an industry that has grown so rapidly that it has been, at times, awkward in its movements. I would not be surprised to see the 1930 development eclipse the growth of both 1928 and 1929 in many features."

Mr. Kuehl and the Holstein Air Marker

BEFORE me I have a letter from Mr. E. A. Kuehl, of Holstein, Iowa, in which he takes me to task for a mistake in my account of the air marker installed at Holstein which appeared in the Airport and Airway Section for February.

I credited him with paying for the marker, and he says that this is not the case.

"The first error," he says, "was that the meridian indicator is sixty-nine feet long instead of sixty. That's nothing. But the second is more serious—much more! The project was promoted by myself and John W. Schneckloth, but we did not bear the expense of installing. It was paid for with donations by a number of air-minded citizens of this city."

I herewith offer my most sincere apologies. Let no citizen of Holstein doubt that Mr. Kuehl is blameless in the matter.

AIRPORT AND AIRWAY PROGRESS

St. Louis Airport Construction Program to be Inaugurated

ONE of the best examples of a scientific solution of an airport problem is that of the new municipal airport at St. Louis, where a recent meeting of the airport commission approved the three-year building program and opened the gates to a period of rapid construction and early occupancy.

The firm of B. Russell Shaw Co., Inc., retained by the city to engineer the project, produced detailed plans and specifications calling for a rather elaborate airport. As construction progresses and funds become available, the field will become more and more elaborate; but for the present, large scale air traffic can be handled there without difficulty with the equipment now available. Double runways for each wind direction will be the ultimate goal, but the single runways to be constructed this year will handle as much traffic at the field for the present.

(*Continued on next page*)

Recently completed administration building at Kansas City Municipal Airport

(Continued from preceding page)

The runways will be built in such a manner that they will not interfere with the present use of the field, and complicated drainage and storm-sewer systems will be installed, also without interfering with present traffic. A large terminal building with underground passages to the loading area, a huge parking space, roads and drives, swimming pools, tennis courts and recreation field, clubhouse for the members of the St. Louis Flying Club and the air board of the St. Louis Chamber of Commerce are also provided for in the plans.

The estimated cost of the project is $2,000,000, which sum will be expended over a period of three years, constantly contributing to the utility of the field but never interfering with traffic while construction is progressing. The Shaw company was given a free hand within the financial limits provided, and the Airport Commission accepted its plans without long-drawn-out arguments and delays. The significance of the plan is basically this: the Airport Commission, not comprised by technically trained engineers, selected a well-known firm and adopted the final plan which that firm submitted. In this way, the city was saved a great deal of expense, the engineering firm can proceed unhindered with the work of design, and the resulting airport will be a great deal more efficient than if the engineers had been forced to revise, change, alter, compromise and wheedle consent from a board of egotistical politicians.

Notices Regarding Airway Maps

THE United States Coast and Geodedic Survey is establishing a mailing list in order that those who desire information concerning the various maps and bulletins published by the Survey may be supplied. The bureau is publishing airway strip maps to a scale of eight miles to the inch, covering an area eighty miles wide along established airways. These maps show streams, roads, railroads, towns and elevations, and emphasize features of importance to aviators, such as airports, beacons, high tension lines and magnetic courses. If you desire to add your name to the list of those who receive notices of new strip maps as they appear, send your name and address to the Director, U. S. Coast and Geodedic Survey, Washington, D. C., for inclusion on Mailing List 109-R. The maps are priced at thirty-five cents apiece.

Bids on Little Rock Air Depot

ON April 5th, bids will be opened at the Munitions Building, Washington, covering the leasing of Little Rock Air Depot, Little Rock, Ark., for a period of five years. The Government, with characteristic precision, states that the property contains 115.804 acres "more or less."

The holder of the lease has title to everything on the field except two hangars reserved for the Arkansas National Guard; the refueling system installed for the National Guard and various other equipment named in the preliminary announcements concerning the terms of the lease.

Little Rock Air Depot is a fairly good airport. The Government has spent a considerable sum grading, leveling and draining, and has erected buildings which could be occupied without alteration by an air transport company or a flying school. It has a turf runway, 3,000 feet long in the direction of the prevailing wind, with other runways varying from 1,260 to 1,500 feet; hangars, shops, engine test sheds, water tanks and other equipment needed to carry on the business of flying. When the bids are opened on April 5th, the lessee will find himself in possesion of a practical and serviceable airport without the expense of building it himself.

Speculation as to which among the air transport companies operating in the South needs a base at Little Rock will be answered shortly after the bids are opened. It is almost on a direct line between Kansas City and New Orleans, and might be a means of promoting another mail line from the Gulf into the Middle West.

New Building at Kansas City Airport

AN administration building, erected at a cost of $60,000 and located in the southeast corner of the Kansas City Municipal Airport, was completed recently and opened with formal ceremonies. The exterior is of brick with terra cotta trim, and the building is flanked with a concrete driveway for the convenience of passengers and visitors who arrive by auto.

The first floor contains a waiting room, ticket office, telegraph office and rest rooms. On the second floor are offices of the field manager, traffic officials, quarters for pilots and canopy-covered porches for summer observation.

Start Lighting of L. A.-Kansas City Line

CONTRACTS have been awarded and work started on the lighting of the Dagget-Seligman section of the Los Angeles-Kansas City airway, according to recent announcements by Western Air Express. With this work done, the entire airway of 1,420 miles will be lighted for night flying with the exception of a single link between Seligman and Gallup, N. M., about 200 miles. It is expected beacons will be established over this stretch before the end of the summer.

The Dagget-Seligman section is approximately 245 miles. It is to be lighted with seven beacons spaced from twenty to thirty-eight miles apart, according to the terrain. The beacons are to be of the standard revolving type mounted on towers fifty-one feet high. Each will be of 2,000,000 candlepower. In addition, spaced along the course between the lights, there will be two course lights—red blinkers which designate the route the pilot is to follow and which flash in code the individual beacon number so that the pilot may know his exact location.

New W.A.E. Passenger Station

THE pilot who arrives over Los Angeles and endeavors to pick out a single airport among the thirty-odd which are located within the "city limits," will have no difficulty in identifying the new $100,000 edifice of Western Air Express, located at the company's airport. A large bronze-covered dome reflects the sun's rays as would a beacon, acting as a dependable guide and establishing the port's position immediately. Landing, the pilot walks into the new structure and inspects the new passenger terminal and waiting room, dining room, baggage room and air mail department. Radio operators and dispatchers occupy the dome and the second floor.

Arrangements are such that the planes may be dispatched three at a time and the passengers may walk to and from the cabin planes through a covered runway. An illustration of the building accompanies the article of Mr. Harris M. Hanshue in this issue.

New Field at Lubbock, Texas

ON the southern plains of the Lone Star State is the town of Lubbock, which notifies us that it has purchased a tract of 640 acres of land, cleared it, done some grading and leveling and that the field is now in condition for regular use. A bond issue has been passed by the town's citizens for the purpose of adding more equipment. Bids have been asked for erection of a hangar.

In the more congested North and Middle West, 640 acres of land is a "section," which usually contains about four farms. Few airports have such ample acreage, and few such level terrain that little expense for grading is necessary. Good accommodations are promised by the successful bond issue, and it is notable that every day more and more pilots are taking advantage of the new port to stop for gasoline and service. A welcome is extended to all fliers by A. B. Davis, manager of the Lubbock Chamber of Commerce.

Good News for Hadley Field

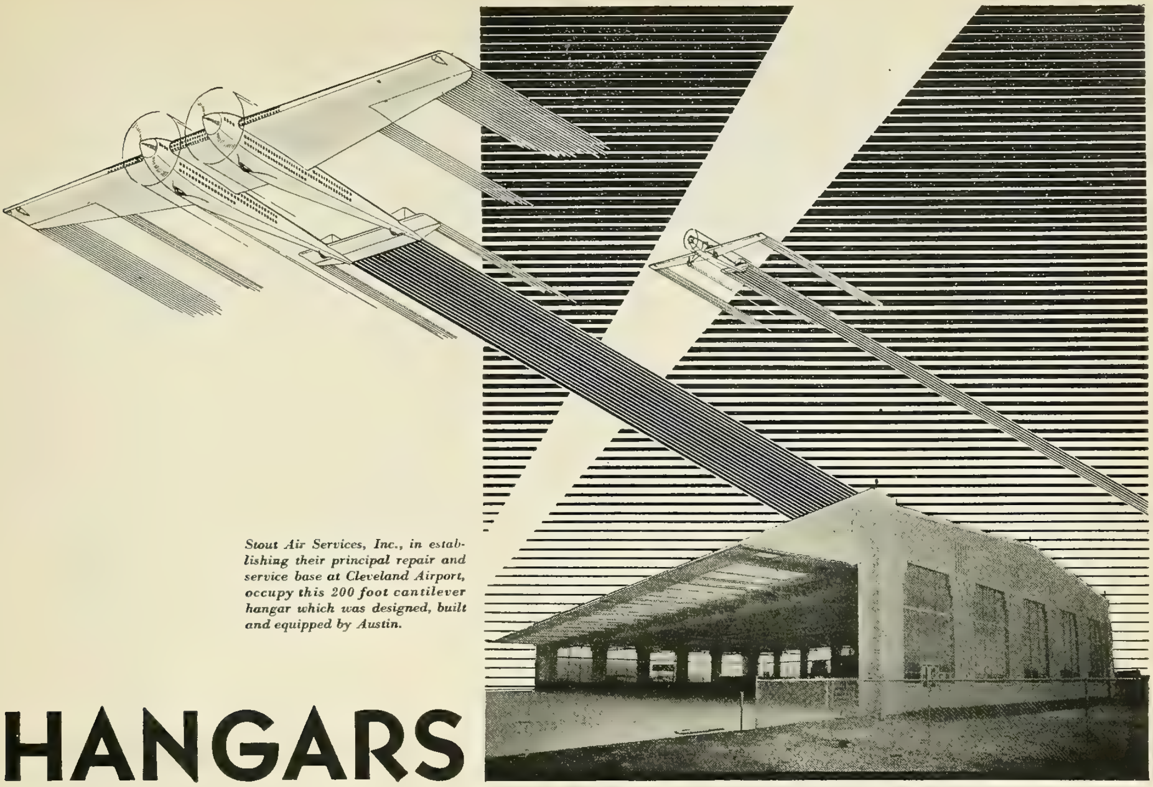
THE ominous presence of the 400-foot radio towers on the edge of Hadley Field at Franklin, N. J., has been slightly counterbalanced by the installation of a series of lights which guard the property and keep unwary fliers from draping themselves across the network of wires. Ever since the field came into prominence as the terminus of the transcontinental air mail route, those towers have constituted a menace. There are thirteen of them, each 400 feet high, located approximately four miles southwest of the field. They are located in groups of two, each group 970 feet from its neighbor, and the whole outfit covers a lineal distance of about a mile, with an average width of 1,500 feet. The lighting consists of one standard twenty-four-inch beacon, revolving six times a minute and showing a red light. It is located on the third mast of the northern group, and will be operated from setting sun until dawn.

NEW COMPANIES AND MERGERS

S.A.T. Merges Braniff and Central Lines

THE management of the Braniff Air Lines, Inc., and the Central Air Lines, Inc., has been taken over by the Southern Air Transport Division of American Airways, Inc., the operating company for the Aviation Corporation. Headquarters for the newly amalgamated system

(Continued on next page)



Stout Air Services, Inc., in establishing their principal repair and service base at Cleveland Airport, occupy this 200 foot cantilever hangar which was designed, built and equipped by Austin.

HANGARS

. . . . to house the 100 passenger transport or 3-place sport models

ONCE a simple shelter with 40 or 50 ft. clear span, capable of protecting against wind and weather, was sufficient for a hangar. Today, however, the hangar must provide up-to-the-minute repair and servicing facilities, comparable in efficiency to those now in use in other fields of transportation.

With larger ships and definite operating schedules, many factors become of vital importance today. Clear spans, unobstructed working areas, new types of doors . . . all of these must have thorough consideration for the modern hangar.

Increased efficiency in design and construction is therefore demanded . . . . *and Austin, because of long study and experience in the field, is supplying the demand.*

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________x________with________ft. clearance. ☐ Factory approx.________sq. ft. Name________
Position________Firm________City________ AD 4-30

Courtesy of Southern Airport Construction Co.

New hangar of the Curtiss-Wright Flying Service at the Municipal Airport, Miami

(*Continued from preceding page*)

will be in Forth Worth under the leadership of C. R. Smith, general manager.

The Braniff lines operate from Dallas and Fort Worth to Tulsa, and the Central Lines operate from Tulsa to Kansas City.

Varney Now in the Express Business

WALTER T. VARNEY, one of the oldest commercial airplane operators and one of the most successful present-day mail line operators, is the latest to adopt the aerial express business as a corollary to the task of carrying mail between Salt Lake City and Pasco, Washington.

With impressive ceremonies at Boise, Idaho, a package was handed to Pilot Jack O'Brian addressed to Senator Borah at Washington. In the plane were other packages from Portland, Spokane, Seattle and Tacoma. The local express office sent small packages too, but without the benefit of ceremony.

The new service was made possible by an agreement between the Varney lines and the Railway Express Agency. This is the eleventh case of the kind; the other ten were mentioned in a previous paragraph

Wedell-Williams Air Service, Inc.

THE inaugural trip of the newly-formed Wedell-Williams Air Service, Inc., took place in New Orleans, La., on March 15th, when the first of the company's new Ryan Broughams departed for Baton Rouge, Alexandria and Shreeveport, La. A schedule of one trip a day in both directions is planned for the present, with more frequent service to be added as soon as conditions warrant.

Fares are rather high. From New Orleans to Baton Rouge, $6.75; to Alexandria, $15.00, and to Shreveport, $22.50. Express parcel service is also furnished.

Doug Davis Operating Between Birmingham and Atlanta

DAVIS AIR LINES, INC., of which Doug Davis, noted pilot of the Travel Air "Mystery Ship" is president, began operations between Atlanta and Birmingham last month. One trip a day in each direction is the company's policy at present, says Ralph E. Hurst, director of public relations. Travel Air six-place cabin planes are used on the line. One way fare is $15.00; quite reasonable. Express, twenty cents per pound with a minimum charge of one dollar.

Considering the amount of railroad traffic on this route, a conservative prediction would be that it is an excellent air transport possibility. The two cities are not far apart, but the train service is crowded in spite of only mediocre accommodations. It is one of the main highways of the old South; on the direct line between New York and New Orleans and connecting at Atlanta with the main airway to the North and to Miami. The fare is not exorbitant, and with proper management the line should prove a big success. The best wishes of this department attend the new venture.

REGULATING AIR TRAVEL

Proof That the Law Has Teeth

DURING the last two weeks, the most encouraging items came into this office from Washington and from California. They show that the attempt to drive the unlicensed pilot and unlicensed plane out of the sky is more than an idle gesture, after all, and that it might be successful in time.

During the calendar year 1929 the Department of Commerce, Aeronautics Branch, dealt with 523 violations of the Air Commerce Act, air commerce regulations and air-traffic rules. Fines were assessed for 179 of these violations, and the amount collected was $4,755. During the same period, fifty-five cases were dismissed for lack of evidence; 163 pilots were reprimanded; 110 licenses were suspended and sixteen licenses were revoked altogether.

If Washington misses one, California gets him. We published an announcement recently concerning the sheriff of Alameda County, who had a posse with which he pursued unlicensed pilots who landed within his domain. At San Leandro, Calif., one James T. Canavan of San Francisco, who committed the mistake of flying without proper credentials, inadvertently landed on the local airport only to find himself chased by the limb of the law and haled into court.

He was sentenced to serve 125 days in jail, or pay a fine of $250. He said he would pay the fine. His arrest came about after he had crashed an old "Jenny" with which he was wobbling about the sky.

Report of the New York State Aviation Commission

ONE of the most complete reports of a State aviation body is presented in the report of the New York State Comission on Aviation dated February 17th, 1930. It contains a complete list of all bulletinized airports in the State with copies of the Department of Commerce airport bulletins. A supplementary list contains the locations and descriptions of airports which have not been bulletinized.

A section of the report shows the aviation progress within the State in the last twelve months, and another portion gives the various laws of the State of New York governing aviation. Obstructions to air navigation, such as high tension lines, are noted on charts and maps.

AIR MAIL NOTES

Another Fokker F-14 for Western

THE second Fokker F-14 mail plane to be used on the Los Angeles-Salt Lake route of Western Air Express was ferried across the continent recently by Pilot Hal Halloway, and placed in service on the line immediately after its arrival.

The plane's performance is said to be excellent by the Western Air Express officials, who point to its carrying capacity of 2,000 pounds payload at a 140-mile-an-hour rate, on its single engine. Six passengers are provided for in the cabin; the pilot sitting in an open-cockpit near the tail.

The wing is of the parasol type with the usual Fokker thick center section and tapered wing tips.

The Growth of Air Express Traffic

TEN firms are now carrying air express under contract with the Railway Express Agency, reports Col. Harry H. Blee, director of Aeronautics Development for the Aeronautics Branch, Department of Commerce. They are: Western Air Express, Boeing Air Transport, Clifford Ball, Continental Air Transport, Embry-Riddle, National Air Transport, Northwest Airways, Pacific Air Transport, Robertson Aircraft Corporation, and Thompson Aeronautical Corporation. Other than the above, several firms have developed their own package service between terminals or points on their routes, such as Colonial between New York and Boston, and the Kohler Aviation Company, between Milwaukee, Muskegon and Grand Haven, Michigan.

Although the air express service is now being operated only over certain designated routes with scheduled stops at eighty-two cities, it is available to all shippers who find that time must be saved.

Eastern Air Transport Revises Route Schedules

ABOUT April 1st, air mail schedules will undergo a general revision along the New York-Atlanta-Miami airway, operated by Eastern Air Transport. The changes will give cities between Washington and New York service by six mail planes a day, the most frequent service of any section of the country. Four planes will be operated each way between New York and Atlanta, while the northbound service from Miami to Atlanta via St. Petersburg will change from a day to a night schedule. The city of Charlotte, N. C., will be added to the air mail map as a permanent stop on the route.

(*Continued on next page*)

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These changes will have a noticeable effect on service along the entire Atlantic Seaboard. They will move every city between Richmond and Miami one full day nearer the Middle West and the Pacific Coast, and will place all Florida points overnight from New York. Business men from the North and Middle Atlantic States will have two schedules to Atlanta and intermedite points, and a fast overnight service to all Southern points as far south as St. Petersburg, Miami, Atlanta and New Orleans.

Under the new system, a plane will take off each day from New York at 3 p.m., fly south to Atlanta with stops at Camden, Washington, Richmond and other points along the line. At 9:10 p.m., a second southbound plane will leave New York, covering the same route and including Charlotte, N. C. A third southbound plane will take off each morning from New York for Washington, stopping en route at Camden, Baltimore and Washington. This section leaves New York at 4:45 a.m. The volume of air mail on this airway is growing so great that in recent months two sections of each trip have been necessary. The Post Office Department has revised the schedules so that double service will be provided between the points of heaviest traffic.

February Poundage Exceeds January

THE amount of air mail transported during the month of February was slightly in excess of that carried during the first month of the year, reports the Post Office Department. The increase for February was 49,243 pounds, in spite of the fact that that month has three less days than January. The total for the month was 555,176 pounds, as compared with 505,933 pounds in January.

Watres Bill Passage Foreseen

WIDE spread support has been offered by the aviation industry for the Watres Bill for readjustment of air mail rates, known to the Congressional clerks as House Resolution 9500. In a recent statement, the Aeronautical Chamber of Commerce says that its action in urging the bill's support reflects the opinion of 500 major corporations in all branches of the industry, and that sentiments favoring support of the bill were communicated to members of the Senate and House Committees on Post Offices and Post Roads in a telegram signed by Frederick B. Rentschler, president of the organization.

This measure has been described fully in previous issues of AERO DIGEST but for those to whom it is unfamiliar a short outline will be given. It proposes the payment of compensation for transporting air mail at fixed rates per mile for definite weight spaces, but not to exceed $1.25 per mile; instead of the present poundage basis with a $3.00 pound limit. It also proposes a reduction of air mail rates. It would enable the Post Office Department to utilize all space in a mail plane for carrying other mail than strictly air mail. It would enable air mail to be sent to any point on the present routes for five cents for any ounce or fraction thereof, instead of five cents for the first ounce and ten cents for each additional ounce. It would also enable the air mail carriers to carry commodities other than air mail. Passengers and express, for instance.

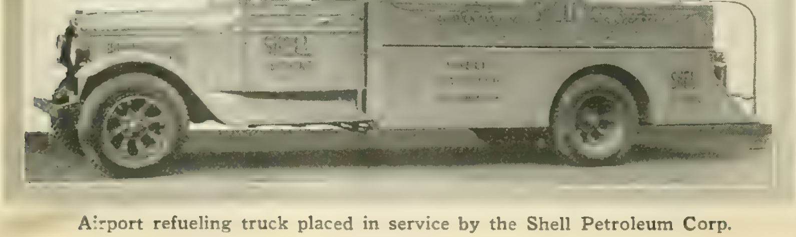
From all sources, aviation and political, the consensus of opinion was that H.R. 9500 would be passed at this Congressional session without delay. There does not seem to be much adverse criticism. Nearly everyone interviewed favors the bill.

THE PASSENGER LINES

Stout and Thompson Bid for Detroit Cleveland Traffic

THIS summer will witness a serious attempt on the part of two large air transport companies to develop their respective sides of the Detroit-Cleveland air traffic. Stout, operating Ford trimotors from Ford Airport to Cleveland Airport, with bus transportation to the cities, announces that another daily run will be added to its total, making four planes a day in each direction and excellent facilities at both ends, since it took over the gigantic Austin hangar at Cleveland and placed John Halpin in charge of it. The fare of $10 and the comfort of the big Ford planes will attract a greater volume of business than ever before.

Thompson is reviving its all-water route between the lake shore at Cleveland near the new Auditorium, which housed the aircraft show last year, and the foot of Woodward Avenue, Detroit; the precise center of Detroit business activity. It will use several new Keystone-Loening Air Yachts and will run several trips per day; how many we do not know at present. Last year Thompson ran four planes a day, and this year the company plans a greater frequency of schedule. The fare on the amphibious route is not given, but is believed to be about $18.



Airport refueling truck placed in service by the Shell Petroleum Corp.

It is not so many years since the Detroit-Cleveland run was believed to be a Jonah. Before the Ford-Stout interests inaugurated a line, two or three unsuccessful attempts had been made to conduct a paying air transport line betwen the two cities. In 1920 and 1921 the old Aeromarine Airways operated a couple of F5L seaplanes over the route at a reputed fare of $75, but traffic was not responsive. The excellent train, boat and electric car service between the two cities is responsible for some of the competition, but up until two years ago there was reason to doubt that such a line would ever be successful.

Since that time, we have seen the Stout Air Lines reduce fares on the line three times until a low record of $10 was reached. Last year Thompson carried 3,000 passengers in six months; an average of more than fifty per cent capacity for the season.

These two firms have proved that the traffic is present and that modern equipment and excellent service will develop it. They are not competitors in any sense. Each has its own clientele and its own section of the public to serve. Their record during the coming summer season will be watched with interest by all branches of the aviation industry.

S.A.F.E. Breaks Own Traffic Record

OF all the airlines operating through St. Louis, Kansas City and Dallas, the Southwest Air Fast Express, headed by Mr. Halliburton, took the lead in traffic by transporting 16,898 passengers in the nine months ending December 31, 1929. These passengers were carried without injury to any passenger or employee, and with but one forced landing.

As a result of the fare cuts around the first of the year, S. A. F. E. early this year increased the number of ships in daily operation to sixteen trimotored Fords. In May the company plans to open a new line from St. Louis to Los Angeles via Sweetwater, Texas; an overnight train ride and cooperation from Standard Airlines providing the necessary extensions.

Colonial Shows Traffic Gain

IN February, the New York-Boston line of Colonial Air Transport showed the remarkable gain of 240 per cent over December, the month prior to the fare reduction. Three round trips are being made in each direction. A night pasenger line is being considered for inauguration this summer, as well as another run in the afternoon.

NEW DEVICES AND METHODS

Shell Designs Airport Service Truck

A NEW type of truck body to be used at airports is shown by the Shel lPetroleum Corporation in a new Dodge two-ton chasis. The main body is divided into three compartments for various grades of gasoline, which are pumped by the truck through a

(Continued on next page)

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registering meter to the tanks in the plane. The truck also carries lubricating oil, greases, water for the radiator, air for the tires, and tools.

Department Buys 100 Sign Flashers

A CONTRACT for 100 sign flashers of a new type incorporating a mercury tube make-and-break contact instead of the old style metallic contacts, has been awarded by the Aeronautics Branch, Department of Commerce, announces Maj. Young.

The flashers are to be embodied in electric code beacons, which are stationary auxiliary lights mounted on towers between beacons for use as obstruction lights, markers for landing fields or other points where identification is needed by the pilot on dark nights. The flashers are being made by Carlisle and Finch Company of Cincinnati.

APPLICATION for authority to install the first of his aerial beacons at Oakland Municipal Airport has been made to the Board of Port Comissioners by Capt. Burdette Palmer. The beacons consists of a captive balloon, to hover over the field, and an "electric eye" which is attached to the balloon cable and which registers the ceiling above the flying field and the density of the fog. The balloon is to be sent up above the fog blanket.

New York State Airways Weather Service

By Gustave S. Lindgren

Meteorologist, U. S. Weather Bureau, Albany, N. Y.

AT the 1928 session of the New York Legislature a joint committee on aviation was appointed to make a comprehensive study of the needs and requirements relative to aviation development, and to recommend such laws and regulations as would encourage and aid civil and commercial aviation in the State of New York.

In a report to the 1929 session of the legislature, this committee made several recommendations which, in being adopted, undoubtedly have contributed toward the progress aviation has made in New York during 1929. It is the purpose of this article to deal with one of these: The establishment of a state airways weather service. To carry out its provision, the legislative committee became a commission on aviation, and the chairman of the old committee, Hon. J. Griswold Webb, also became chairman of the commission. A large share of the success of the project is due to his able and enthusiastic leadership.

The rapid improvement of the various phases of aviation leaves the weather as probably the most important present factor in connection with the safe navigation of the air. The weather itself cannot be changed or improved, but it is possible to learn the various elements constituting its make-up. By laying these facts before the pilot, they become important factors in flying, the change of a proposed course, or the canceling of a scheduled flight.

Pursuant to the provisions of the Air Commerce Act of 1926, the Weather Bureau was charged with the duty of ascertaining and making known these facts along certain great trunk lines called "officially established" airways, the primary purpose being to provide safety for the carrying of air mails. An airway does not become "officially established," as far as the Federal Government is concerned, until a contract for the carrying of air mails along such routes has been let.

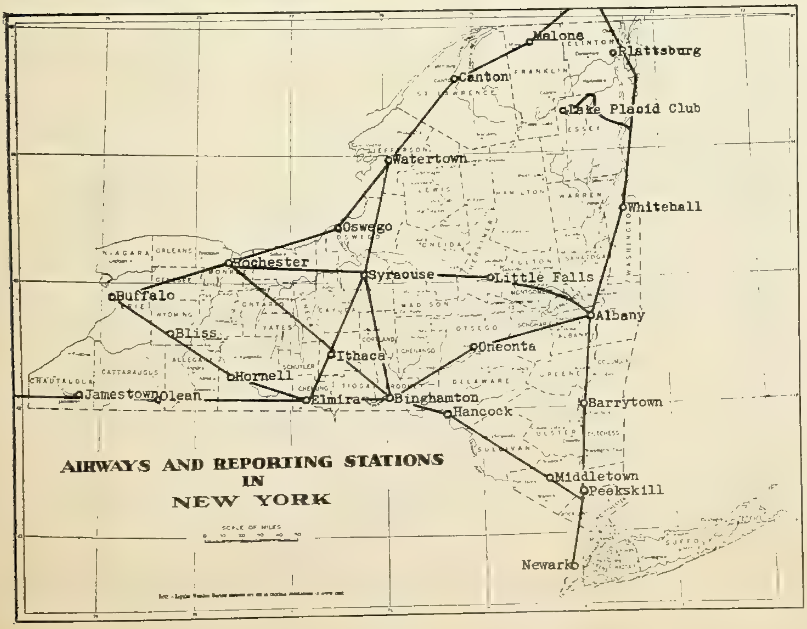
Although we have over 14,000 miles of officially established airways in this country, they cover only a small part of each State, and undoubtedly are not adequate for commercial or civil flying. At the Albany (N. Y.) Airport 3,485 planes were registered during 1929, of which 1,252 were mail and the remainder mostly commercial and civil planes. It is believed that these figures are fairly representative of the country as a whole. There are now ninety established airports or fields in New York, at which flying is done more or less regularly. Of these about fifty-five are located off the Federal-aided airways. In order that this greater number might have the same advantage and encouragement provided by the Federal Government along its officially established airways, the commission proceeded to lay out additional principal and connecting routes, so that a pilot might fly safely to any part of the state where a landing was possible.

Because of the scarcity of trained meteorologists outside of the Government service, it became necessary to obtain the coöperation of the U. S. Weather Bureau. This was readily extended, and the local office of the Weather Bureau in Albany was authorized to proceed with the organization of a State-wide airways weather service under the direction of the aviation commission.

This work began late in March, 1929, continuing through April, and by May 1st it was possible to place the airways in the southern and western parts of the State in operation; those in the northern part began to operate May 10th. The complete network thus established is shown on the accompanying map, which includes also the Federal-aided airways from New York to Montreal and Albany to Buffalo, these becoming a part of the system.

Observations have been taken regularly each day at 8:00 a. m. and 12:00 noon, Eastern Standard Time, at the twenty-six stations comprising the system, and telegraphed to the Weather Bureau office in Albany, where they were charted and also entered on specially designed forms for rapid distribution. Inasmuch as speed is essential in work of this kind, the fullest coöperation of the Western Union company was obtained. Simplex machines were installed in the Weather Bureau receiving office to expedite the incoming messages and outgoing bulletins. Usually by 8:30 a. m. and 12:30 p. m. all the observations had been received and charted, and twenty minutes later bulletins containing the observational data had been telegraphed to the more important airports in the State. Through the courtesy of the radio station WGY of the General Electric Company, Schenectady, broadcasts of all the data received were made at 8:53 a. m. and 12:53 p. m. Later in the season, through the courtesy of the Stromberg-Carlson Company, Rochester, broadcasts were also made from the radio station WHAM.

The standard Weather Bureau airways in-



AIRWAYS AND REPORTING STATIONS IN NEW YORK

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struments were installed at each station equipped by the State, comprising twelve-foot wind instrument support with four-foot vane and three-cup anemometer, the latter having one-sixtieth mile contact and electrically connected with velocity indicator, aneroid barometer, and tested thermometer exposed in standard airways shelter. The installation of the instruments and the selection and training of the observers was done by an experienced meteorologist, the same care being exercised that obtains in connection with the establishment of Weather Bureau airways stations.

All observations made during the period from May 1st to December 30, 1929, have been classified and tabulated, in order that a check-up might be made on the bad spots of the various airways. It is recognized that data covering only eight months are not sufficient upon which to base definite conclusions, but that they have furnished a good index of localities more or less favorable for flying is certainly indicated.

Ceilings and visibility have been divided into four classes: dangerous, poor, fair and good. A ceiling of less than 500 feet is termed dangerous; from 500 to 750 feet, poor; 750 to 1,500 feet, fair; and above 1,500 feet, good. The visibility is classified as dangerous when less than one mile, poor from one to two miles, fair two to three, and good when more than three miles. It is further recognized that this is a rather arbitrary classification, that 500-foot ceilings while dangerous in certain localities may be safe in others, but for the general purpose of study and comparison it will suffice.

Figure 1 gives the total number of observations for the period at each station and the total amounts in each class. It will be noticed that there is quite a variation in the total number of observations, due to the earlier opening of some stations and the closing of others in December. In order to place all data on a comparable basis, Figure 2 shows each class expressed in terms of percentages.

In Figures 3 and 4 dangerous and poor ceilings and visibility have been grouped into one class, respectively, and the wind direction noted at each occurrence. The purpose of this was to ascertain whether these conditions obtained with certain winds, and if so, to foresee them by determining the probable wind directions from the weather map.

Stations	N	NE	E	SE	S	SW	W	NW	CALM
Newark	2	23	0	3	3	4	2	0	7
Peekskill	14	13	8	26	25	13	3	8	8
Barrytown	0	0	0	0	0	1	0	0	0
Albany	0	1	0	0	1	0	0	0	0
Whitehall	6	0	0	0	5	0	0	2	[illegible]
Burlington	9	1	0	1	1	2	0	4	7
Plattsburg	0	0	1	0	0	2	1	0	0
Lake Placid Club	1	5	27	5	4	12	81	6	0
Little Falls	2	5	17	14	2	4	25	7	0
Syracuse	0	1	0	0	0	1	3	3	0
Rochester	4	4	2	0	0	1	1	0	0
Buffalo	1	3	3	1	1	8	5	1	0
Middletown	1	2	0	0	0	0	0	0	0
Hancock	0	0	1	14	9	5	4	2	0
Binghamton	2	6	0	1	0	0	0	1	1
Elmira	4	3	3	4	3	2	3	3	[illegible]
Hornell	0	0	0	0	0	0	0	0	0
Bliss	0	0	1	0	0	1	3	0	1
Olean	0	1	0	0	1	[illegible]	2	1	[illegible]
Jamestown	4	0	0	1	1	7	1	1	1
Ithaca	4	0	1	2	4	0	0	14	[illegible]
Oneonta	1	1	0	0	2	0	1	1	[illegible]
Oswego	0	0	0	0	0	0	1	0	0
Watertown	0	2	1	0	0	2	0	0	0
Canton	1	2	0	0	0	5	5	1	0
Malone	4	1	0	0	0	5	7	1	1

Figure 3

Stations	N	NE	E	SE	S	SW	W	NW	CALM
Newark	3	46	2	5	13	27	17	5	18
Peekskill	25	12	12	29	36	16	7	17	11
Barrytown	0	2	0	0	3	14	0	0	0
Albany	3	4	2	0	14	5	0	1	0
Whitehall	7	0	0	0	17	3	0	2	0
Burlington	6	1	0	0	0	3	0	1	3
Plattsburg	0	0	0	0	0	0	0	2	0
Lake Placid Club	1	5	25	9	3	14	73	5	0
Little Falls	2	1	25	18	3	5	19	6	0
Syracuse	2	4	12	7	12	5	10	14	0
Rochester	6	9	6	1	4	8	11	1	0
Buffalo	3	9	17	27	18	47	21	8	0
Middletown	1	3	0	2	1	1	0	0	0
Hancock	0	0	1	10	8	2	2	3	0
Binghamton	3	12	6	1	1	2	5	2	2
Elmira	3	3	2	3	2	1	2	4	6
Hornell	1	1	0	0	3	4	4	0	0
Bliss	0	1	1	0	1	5	16	2	2
Olean	0	3	1	0	1	22	2	3	14
Jamestown	8	14	8	18	27	30	14	8	24
Ithaca	4	0	0	1	3	0	0	12	0
Oneonta	8	3	2	12	6	2	0	2	10
Oswego	0	1	0	1	0	3	5	2	0
Watertown	1	2	0	0	0	1	1	1	0
Centon	3	3	1	0	0	13	10	1	0
Malone	5	1	0	0	2	7	11	2	1

Figure 4

Tabulation of wind directions at the time of poor and dangerous visibility

An analysis of the data set forth in the above tables discloses some interesting facts. A few will be mentioned. As was foreseen, Peekskill is the most dangerous spot between Newark and Montreal, with twenty-five per cent of dangerous and poor ceilings and thirty-five per cent of dangerous and poor visibility. The predominating winds with these were south and southeast, forty-three per cent in connection with ceilings and thirty-nine per cent with visibility. Peekskill is located within the Highlands of the Hudson, and the conditions noted above are produced by moisture-laden southerly winds rising against the mountain sides, forming fogs and low-lying clouds.

Northeast appears to be a wind to reckon with at the Newark Airport, it having produced fifty-two per cent of the dangerous and poor ceilings and thirty-four per cent dangerous and poor visibilities. This is probably due to large quantities of smoke coming from manufacturing plants, especially to the northeast, causing frequent hazy and foggy conditions.

At Syracuse and Buffalo the amounts of dangerous and poor ceilings are negligible, but those in connection with the visibility reach fourteen per cent at the former and thirty per cent at the latter place. Since the observations were taken at the Weather Bureau offices in each respective city, local smoke may be assigned as the cause. This year observations are made at the Buffalo Airport, and undoubtedly will show a decided decrease in the above amount at that station. Wind direction apparently played no important role at Syracuse, but at Buffalo thirty-one per cent of dangerous and poor visibility came with southwesterly winds.

At Lake Placid an interesting local condition is disclosed. As will be seen from the tables, thirty per cent dangerous ceiling and twenty-nine per cent dangerous visibility occurred, fifty-seven per cent of the former and fifty-four per cent of the latter being accompanied by westerly winds. Lake Placid is located in the northern Adirondack Mountain region. To the south and north are Mts. Marcy, McIntyre, Whiteface and others and to the east the Sentinal range. Westward lies the narrow Ray Brook valley and beyond this an area with numerous lakes, the largest ones being the Upper and Lower Saranac. A west wind in passing over these lakes apparently gathers sufficient moisture which later is condensed into fogs and low-lying clouds when forced upward against the western slope of the ranges to the east.

That data of this nature may be utilized in ascertaining the probability of performed schedules is indicated by an analysis of those covering the Albany-Buffalo airway. Figure 3 shows an average of 2.6 per cent dangerous ceilings, including both terminals, and seven per cent dangerous visibility. The combined average of these, 4.8 per cent, would indicate a probability of ninety-five per cent performed schedules. As a matter of fact, actual flying of the air mails along this route during 1929 showed a performed schedule of ninety-six per cent.

In organizing this service no attempt has been made to pattern it after the model airway established by the Guggenheim Fund from Los Angeles to San Francisco. The purpose was to furnish weather conditions at the beginning of the forenoon and afternoon periods to pilots desiring to fly to any landing field in the State. That it has, within its limited scope, been a decided aid is evidenced by numerous favorable comments received from fliers of all kinds, and by an ever increasing demand for its service at the various airports.

10,000 Passengers in Twenty-seven Days

AIR FERRIES, LTD., operating a shuttle service between Oakland and San Francisco, announced that its ten thousandth passenger was carried the twenty-seventh day after the line went into operation. Three Loening amphibions are being used at present, but more will arrive soon to augment the present service.

Stations	Ceiling				Visibility				Total Number Obs.
	Dangerous	Poor	Fair	Good	Dangerous	Poor	Fair	Good	
Newark	33	11	32	372	95	41	93	219	448
Peekskill	98	19	91	270	[illegible]	15	47	[illegible]	478
Barrytown	2	4	15	451	9	10	54	399	472
Albany	1	1	44	444	7	18	36	425	490
Whitehall	3	10	119	277	10	19	66	314	409
Burlington	19	6	22	370	14	0	34	369	417
Plattsburg	4	0	142	312	2	0	0	456	458
L. P. Club	141	0	54	271	135	0	40	291	466
Little Falls	32	44	112	290	35	46	97	300	478
Syracuse	4	4	72	409	28	38	131	292	489
Rochester	8	4	94	381	19	27	101	340	487
Buffalo	12	11	69	397	81	69	119	220	489
Middletown	2	1	30	340	4	4	37	328	373
Hancock	28	5	116	279	19	7	82	320	428
Binghamton	10	1	33	439	34	0	48	[illegible]	483
Elmira	23	11	26	420	24	2	18	436	480
Hornell	0	0	47	328	13	0	48	314	375
Bliss	5	1	13	408	28	0	49	350	427
Olean	19	0	21	388	45	1	41	341	428
Jamestown	6	10	147	264	91	64	76	196	427
Ithaca	22	5	28	337	19	1	13	359	392
Oneonta	13	0	67	286	41	4	37	284	366
Oswego	1	0	25	381	8	4	22	373	407
Watertown	5	0	17	388	6	0	7	397	410
Canton	14	0	21	375	51	0	41	[illegible]	[illegible]
Malone	18	0	51	332	29	0	8	[illegible]	[illegible]

Figure 1—Total number of observations and conditions recorded, seven months

Stations	Ceiling				Visibility			
	Dangerous	Poor	Fair	Good	Dangerous	Poor	Fair	Good
Newark	7	3	7	83	21	9	22	48
Peekskill	21	4	17	58	32	3	10	55
Barrytown	#	1	3	96	2	2	12	84
Albany	#	#	9	91	2	4	7	87
Whitehall	1	2	29	68	2	5	16	77
Burlington	5	1	5	89	3	0	8	89
Plattsburg	1	0	31	68	#	0	0	100
L. P. Club	30	0	12	58	29	0	9	62
Little Falls	7	9	23	61	7	10	20	63
Syracuse	1	1	15	83	6	8	27	59
Rochester	2	1	19	78	4	5	21	70
Buffalo	3	2	14	81	16	14	24	46
Middletown	1	#	8	91	1	1	10	88
Hancock	7	1	27	65	4	2	19	75
Binghamton	2	#	8	90	7	0	10	83
Elmira	5	2	5	88	5	#	4	91
Hornell	0	0	13	87	3	0	13	84
Bliss	1	#	3	96	6	0	12	82
Olean	4	0	5	91	[illegible]	0	10	80
Jamestown	1	2	35	62	21	15	18	46
Ithaca	6	1	7	87	5	#	3	92
Oneonta	4	#	18	78	11	1	10	78
Oswego	#	0	6	94	2	1	6	91
Watertown	1	0	4	95	1	0	2	97
Canton	4	0	5	91	[illegible]	0	10	[illegible]
Malone	4	0	13	83	7	0	2	91

Figure 2—Percentage of conditions.
# indicates less than one per cent

CURTISS-STEINBERG AIRPORT

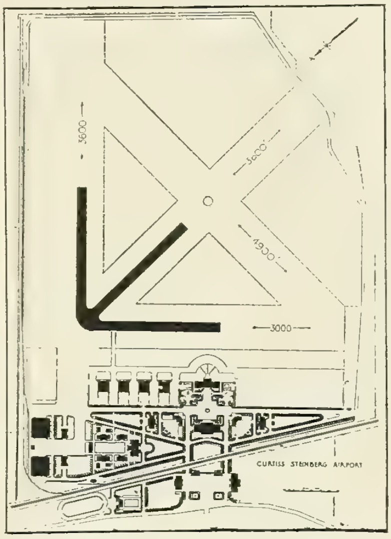
DEVELOPMENT of the Curtiss-Steinberg Airport at East St. Louis, Ill., is scheduled to be completed sometime this spring. T. A. T.-Maddux and the Curtiss-Wright Flying Service are included among the companies which have reserved hangar and passenger facilities and will start operations from the field when the construction work is completed. The Curtiss-Steinberg Airport is located two miles south of the Free Bridge which crosses the Mississippi River between St. Louis and East St. Louis, and is adjacent to a paved highway within fifteen minutes of the St. Louis postoffice.

The field, rectangular in shape, contains 600 acres. The surrounding territory is flat and free from trees, chimneys, high buildings and other obstructions.

When the field is completed there will be three concrete runways 100 feet wide and 1,600 feet in length. Two of these runways will be extended to 3,600 feet and 4,900 feet respectively by the use of hard surface material. The runways will be laid out in the direction of the prevailing winds which are from the south, southwest and northwest. A concrete taxi strip 60 feet wide and 1,500 feet long will extend around the boundaries of the airport and connect the aprons of the hangars.

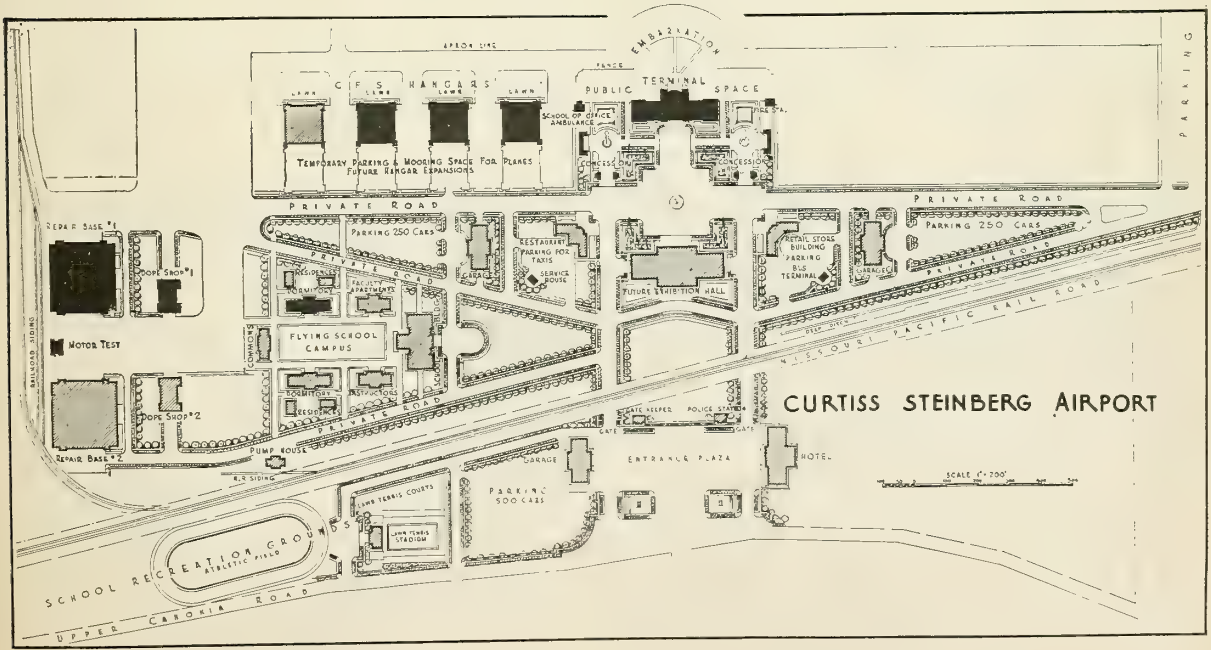
There will be eight hangars at the field when the construction work is completed, the foundations and walls of three of these hangars having been completed in March. Four hangars will be 100 feet square, and doors will be provided on two sides of each of these buildings. Present plans include the construction of four additional hangars 120 feet square. Each hangar will have a promenade located on the side toward the field and an overhead bridge will connect the promenades of each hangar, so that it will be possible to walk from the terminal building along each of the hangars with the flying field in sight at all times. The hangars will be provided with roofs of a new type of mineralized surface which will be colored with orange to give visibility from the air.

A repair base of brick and glazed tile will be 200 feet square and provided with 120-foot square doors on two sides. The equipment which will be housed in this base includes metal working machinery, wood working machinery and apparatus and materials for covering planes with fabric. Planes will be overhauled and rebuilt in the repair base. Present plans include the construction of a dope shop for the doping of wings and fuselage and an engine torque building for turning engines on the block. The Aqua system of fueling, by means of which fuel is forced into planes under hydraulic pressure from underground fueling pits, will be installed at the field. Oil will be placed in the planes from trucks driven out upon the field.



Plan of Curtiss-Steinberg Airport, showing the relation of buildings to the landing area. Hard surface runways shown black.

Lighting equipment which is to be installed will include a 1,000-millimeter Sperry floodlight, a 500-millimeter auxiliary floodlight, and boundary, runway and obstruction lights. A revolving beacon and a radio tower will be installed about one-fourth of a mile from the field. The terminal building will consist of two stories and will include a center rotunda from which the flying field may be viewed without obstruction. Waiting rooms will be located in the center section on the first floor of this building. Ticket and administration offices will be located at one end of the first floor and a lunch room at the other. The rotunda, which will be equipped with the controls for the system of lightings installed at the field and which will contain a restaurant, will be located on the second floor. Opening off the restaurant will be a roof garden for the entertainment of visitors and passengers.



Arrangement of the hangars, passenger station and other buildings at Curtiss-Steinberg Airport, East St. Louis, Illinois

FLOYD BENNETT FIELD, NEW YORK

By Hamilton M. Wright

Construction of New York City's new municipal airport has proceeded rapidly on tidal flats at Barren Island, Jamaica Bay, Long Island, selected as the airport site. Under the supervision of Clarence D. Chamberlain, transatlantic flier, who is consulting engineer on aviation for the City of New York, the new municipal airport will rank as one of the nation's most modern aviation fields.

Fourteen million cubic yards of sand have been dredged in from Jamaica Bay to raise 387 acres of tidal flats and estuaries to a height of sixteen feet above mean low tide level. Upon this sand there have been laid 1,500,000 square yards of sub-soil, which consists of a clay mixture covered with a top soil suitable for sustaining a growth of thick grass. The sowing of the grass is practically completed and it has already started to grow. The 100-foot concrete runways for take-offs are already well toward completion.

In the New York City budget for 1929, $2,500,000 was appropriated for the development of the new field. But additional funds undoubtedly will be required in the final contemplated expansion of the field to more than twice its present size. The future great air terminals of the world must be placed more nearly on an equality with the great rail terminals in facilities for handling outgoing and incoming air traffic on a large scale. The project includes excellent seaplane base facilities. The accessible location in the Jamaica Bay area ought to make the airport a popular place for sighteers, who will find parking area for 3,000 cars.

New York City's new municipal airport will be known as "Floyd Bennett Field" in honor of the distinguished aviator who accompanied Admiral Byrd to the North Pole and later died of pneumonia contracted while on a flight to aid the Bremen transatlantic fliers stranded on Greenley Island.

The location of the air terminal is within the city limits of New York, and it combines three of the principle requisites foı an air terminal, accessibility, freedom from obstructions, and unoccupied adjacent area for future expansion. The new airport is situated about 11.6 miles from the New York city hall, or ten miles from Borough Hall, Brooklyn, and near the end of Flatbush Avenue. It is reached by a Flatbush Avenue car, from which one transfers, within a mile and one-half of the field, to an Avenue U car which runs to within almost one-half mile of the field. But the 180th Street, Bronx Park subway comes within less than two miles of the field. The subway, according to experts, could be extended underground at least to the beginning of the turnpike across the tidal flats, one-half mile distant, without offering any obstructions to air navigation, or it could be extended as a surface line to the end of the turnpike.

The field is adjacent to the road running across the tidal flats en route to Barren Island and Rockaway, a popular summer sea beach. From Manhattan and Borough Hall the route runs through a thickly populated section of Brooklyn, the populated district extending to within a little more than a mile from the site.

The site has been pronounced an admirable location by experts, with no hills or buildings, no railroad tracks or telegraph poles to impede the arrival and departure of planes, and with unobstructed angles of approach over Jamaica Bay and the tide lands. A vast expanse of this partially submerged land threaded with channels and estuaries adjoins open areas of Jamaica Bay and its channels. The location permits the future expansion of the airport to its contemplated final development of 814 acres. The present area, 387 acres, is approximately that of Croydon Aerodrome, London, and Le Bourget Field, Paris, each of which is about 400 acres.

Floyd Bennett Field is a sheltered marine airport, being approached from the Atlantic Ocean by Rockaway Inlet, which lies between Manhattan Beach and Rockaway Point. The inlet is a broad and deep sheltered channel completely cut off from the Atlantic Ocean by Rockaway Beach, and it, in turn, connects with the Island Channel, curving around Barren Island into the channel which continues on past Bergen Beach and Canarsie. The airport is thus surrounded by Jamaica Bay and its channels on three sides and on the remaining side by the Riches Meadows, tidal flats, and Gerritson Inlet.

Two of the prime requisites for any successful airport are a safe landing field and accessibility. This airport will be an allway field on which landings can be made with safety no matter what the direction of the wind. A field must be accessible for both passengers and light express, and also should have swift means of transporting airmail between airport and postoffices. By the extension of the present subway system, the impediment of surface transportation to Floyd Bennett Field can be overcome and the field made accessible in one-half hour to millions of persons throughout greater New York.

The transport of mail is the present most important commercial function of commercial aviation in the United States. Air mail service is rapidly expanding and Floyd Bennet Field is looked to as an important future center for the receipt and distribution of air mail.

But the time spent by mail trucks going through congested streets between the field and Brooklyn postoffice would handicap the field as compared with the more central location of railway terminals where mail is received. To overcome this distance handicap and permit the city of New York speedily to receive and dispatch its air mail within its own limits, rather than receive it through the airport of a nearby city, Mr. Chamberlain has suggested to Mayor Walker that underground pneumatic mail tubes be installed between the airport and the Brook-

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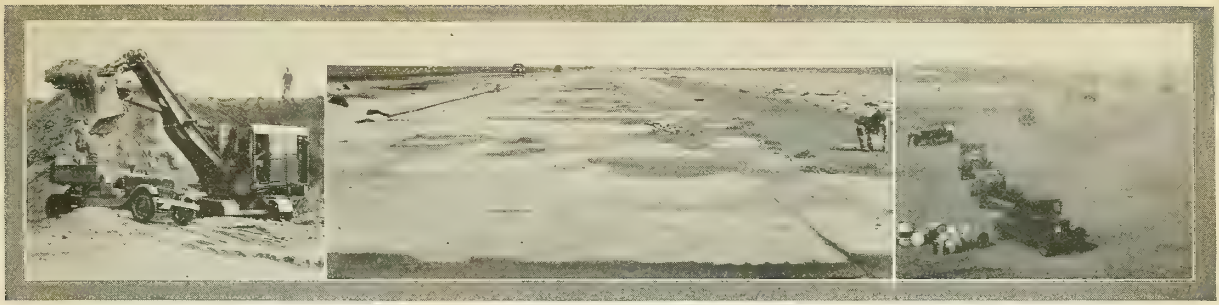
Aerial view of Floyd Bennett Field, New York City's municipal airport, which is nearing completion



Scenes at Floyd Bennett Field, showing work progressing in the development of the New York municipal airport at Barren Island

lyn postoffice. At present New York City receives its air mail through Newark Airport.

Urging the installation of pneumatic tubes from New York City's own municipal airport, Mr. Chamberlin said recently:

"The pneumatic tube appeals to me as a means to effect speedy delivery of air mail and to put the air mail on a more equal footing with railway mail in respect to terminal deliveries.

"In order to reach its full service to the public, which will ultimately mean the carrying of all first class mail between distant towns and cities, air mail should be given every facility to assure the earliest deliveries of arriving mail and the latest moment of posting letters to catch outgoing planes.

"I have watched the successful operation of New York's pneumatic tubes in handling the mails, and am convinced that to tie up these high speed tube systems with the airports near our big centers would give the air mail a great forward boost.

"I have suggested that studies be made of the question of installing tubes between New York City's new municipal airport at Barren Island and the existing pneumatic tube systems of Brooklyn and New York. And I believe that engineering and financial computation will prove their great usefulness, not only to the airport, but also to the thickly populated sections between the airport and the post office which would thus get the advantage of speedier mails."

It is pointed out that in the installation of approximately nine miles of pneumatic mail tube between Floyd Bennett Field and the Brooklyn postoffice there would be five postoffice stations at intervals of about a mile apart that could also be served by the tube, thus giving some very thriving and populous areas improved air mail facilities. About one mile is already installed to Flatbush Avenue station but not in use.

All Greater New York would share the improved air mail services with Brooklyn. The Brooklyn pneumatic mail tube system is connected with the New York system via tubes leading across the Brooklyn Bridge. The twenty-seven miles of double underground pneumatic tubes underlying New York's streets and extending up and down both sides of the city between the Battery and 125th Street, and connecting the main postoffice with the substations, would all be connected up with the new municipal airport by the installation of tubes between the Brooklyn postoffice and Floyd Bennett Field.

The field itself will be grass sodded, which makes an excellent landing area when laid with the right sort of sod. Viewed from the air by approaching travelers the field will present a very attractive appearance with its green area lined by white concrete runways and surrounded by the waters of Jamaica Bay and nearby arms of the sea, with many yachts, resorts and the not-distant ocean. And from the grounds it will present somewhat the aspect of a great public park with areas where visitors may assemble to watch the airliners land and depart. The new idea is to have airports as far removed from dustiness and dreariness as possible, and such buildings as are located at the field architecturally attractive.

The dimensions of the field will be 5,700 feet east and west, the longest distance, and about 3,500 feet north and south. There will be two main runways of concrete, each 100 feet wide. One of these, 3,110 feet long, will run from southeast to northwest, and the other, 4,000 feet long, will extend from southwest to northeast. These runways will be for take-off purposes only and are being constructed in accordance with highway specifications. They will permit the largest and most heavily loaded planes to take off. They will be longer than runways prescribed by the Department of Commerce for A1A airports, which must be not less than 2,500 feet with unobstructed approaches. Undoubtedly other runways will be built to give an eight-directional field, to bring it under class A specifications. And, as for landing facilities, planes may land in any direction on the grass area which will comprise an all-way field. A grass field affords about the best drainage, and unless it is small and a large number of planes are continually arriving and departing, the grass will stand up under the wear and tear.

Initial plans include eighteen hangars of steel and brick, 120 by 140 feet and 34 feet in height. These will be able to accommodate 100 or more planes.

A feature of the airport will be a seaplane base located in the Jamaica Bay channel and consisting of a paved bulkhead area 400 by 800 feet, and 4,800 square feet of hangar space. North of the bulkhead area there will be a beach 1,200 feet long on which planes may be beached and the passengers taken ashore or embarked by means of a gangplank. A concrete ramp 100 feet wide and approximately 2,600 feet long will run from the sixteen-foot level of the field to five feet below water level, thus assisting seaplanes or amphibions in entering and leaving the water. At the seaplane base will be a station with waiting room, ticket offices, restaurants, etc. An aquaplane base on the Jamaica Bay side will have a concrete run from water to shore of four miles.

Floyd Bennett Field is not expected to satisfy all the airport needs of New York City, even by the most optimistic of its sponsors, for they realize that New York will have to have several fields. Each borough should have its own airport. The man who wants to go to the Bronx, for example, will not want to fly to the far side of Brooklyn to get there.

HOW LONG IS AN AIRWAY?

By Ernest Jones

THE definition of an airway is about as clear as that of a modock. It has length, certainly; some height, according to Lieut. Soucek; and width is somewhat set by air traffic regulations. But its real length is the puzzling element. Perhaps it might be better, first, to state the National Advisory Committee for Aeronautics' interpretation of it:

"Airway—An air route between air traffic centers which is over terrain best suited for emergency landings, with landing fields at intervals equipped with aids to air navigation and a communication system for the transmission of information pertinent to the operation of aircraft.

"The term 'airway' may apply to an air route for either landplanes or seaplanes or both."

Now, to ascertain something about the length of an airway. The Post Office Department dug up the latitude and longitude of the center of the various station stops and terminals and computed the airline distance following the curvature of the earth. That sounds simple enough.

But the Air Corps and the Navy ran mileage on their strip maps from Army and Navy fields to Navy and Army airports, blandly leaving the city centers off to one side or the other.

Then the Department of Commerce en-

(Continued on next page)

(*Continued from preceding page*)

tered the field of map scaling, and the heavy red lines run between airports, but not the same airports as those of the Army or Navy.

The Airways Division of the Aeronautics Branch provides along the airways the various facilities known as air navigation aids and these follow the best flying country, within reason,—around a mountain here, through a pass there, and they are continually in a state of flux. Since owner X objects to a light beacon on his land, owner Y must be found, or if his fertile fields are not entirely suitable, owner Z. When all the lights are in, barring occasional removals at the expiration of annual leases, a mean distance is scaled along the course of the lights, and there's another distance to conjure with.

There also might be considered what might be called radio mileage, or that between terminals at which there are radio range beacons. This, again, might be a straight line, and then again, it might not. The terrain might demand an angle in the course, located by a radio marker beacon, and the distance would then be that of two sides of a triangle. In fair weather, perhaps, the pilot would not follow this bent beacon beam but take the airline.

Duplicated Mileage

Just how many miles of airways, navigation-aided or not, no one knows—exactly. There is here and there the overlap, like that of the Kansas City-Omaha route, which duplicates the Dallas-Chicago line between Kansas City and St. Joseph. Of course, the same lights, weather and weather observers, radio operators and telephonists serve, both; but when it comes to making up a table of routes, from one will the tabulator deduct the duplicated mileage, if at all? And how many miles of lighted airways are there here? Nevertheless, the transport operator must pay his pilots and the gasoline company for the full and undiluted distance.

Segregating the Operations

Then, there is the question of services. Perhaps one company operates an express service over part of an air mail system, another conducts passenger service alone over another portion, all in addition to the air mail contractor, who may also carry passengers. How many "services" are operated over the route or system in question?

And just where does a route stop? Damon and Pythias each have their airports just across the river from each other, and the air mails or the passengers actually disembark at one of the two—but just leave the other off the occasional more or less accurate airway map! And, again, there comes the question, to which of the two cities will the distance be estimated?

The terminal of one line has just been changed some thirteen miles closer and the thirteen has been deducted from that route and added to that which joins it on the west, taking a couple of lights and a theodolite from one column to the other. Simple enough, but the operator on whose route the thirteen miles are added says he won't fly a single step farther. Figuring miles of route times number of trips would furnish an inaccurate figure in the latter case, so what is the poor statistician going to do, not to mention the editor who deals with mileages from the various sources of which inkling has been attempted?

FIELD RULES for Le BOURGET AIRPORT

THE importance of adequate regulations at airports cannot be stressed too greatly. Methods of enforcing such field rules constitute perhaps an even greater issue. The number of accidents resulting from insufficient supervision or lax enforcement of air traffic regulations at terminals warrants extensive study with a view to establishing new or revised rules at many places. And there is perhaps no better way to begin the formulation of landing field rules than to examine the codes evolved from the experience of some of the older and larger airports.

Because many of the principal air fields of Europe were developed and handling heavy traffic some time before the growth of commercial flying in the United States had made large, well-equipped airports necessary here, we undoubtedly can glean much helpful information from European precedent. True, we cannot hope to pattern our codes exactly after those employed abroad, for varying conditions necessitate different regulations. Yet the similarities are numerous enough to deserve thorough consideration.

One of the most renowned European air terminals is Le Bourget-Dugny, near Paris, France. In fact, this airport might be termed the capital of French flying. Nearly all of the important airlines of the Continent, as well as England, have routes converging at this field. Obviously, it is imperative that a port where air traffic is as heavy as at Le Bourget, enforce an unusually comprehensive code of field rules—a code such as would serve as a partial guide at least for the compilation of regulations for almost any airport in the United States. Hence, the Le Bourget rules are printed herewith. Since this code was not available in an English edition, at the request of the Air Section of the Police Department of New York, it was translated into English by the New York Municipal Reference Library.

GENERAL RULES

International Agreement

1. An airplane leaving the airport must not turn until at least 500 meters (1,640 feet) distant from the nearest point of the perimeter. Turns must always be made to the left.

2. All planes flying between 500 meters (1,640 feet) and 3,500 meters (11,483 feet) distant from the nearest point of the airport must conform to the above established rules of turning unless flying at more than 2,000 meters (6,562 feet) altitude.

3. Acrobatic landings and departures are forbidden. Airplanes are forbidden to perform acrobatic stunts unless more than 4,000 meters (13,124 feet) distant from the nearest point of approach to the airport, unless the planes are at an altitude greater than 2,000 meters (6,562 feet).

4. No commercial airplane shall take off until the airplane which precedes it shall have completely left the ground.

5. When two planes meet face to face, or almost so, each plane should swerve to its right.

6. When two power-driven planes follow respectively two routes which cross, the airplane which has the other at its right must give the other right of way.

7. The airplane catching up with another must, in order to pass it, turn from its course to the right and not pass under.

8. If two airplanes approach the airdrome at the same time for the purpose of landing, the higher must maneuver to avoid the lower, and to land, must follow the rules of the above paragraph for bypassing.

9. The runway shall be kept free for all airplanes attempting to land on the field

10. All airplanes landing or taking off must in doing so have proper regard for the direction of the take-off and leave all planes which have already descended, or are preparing to leave the field, clearly to the left.

11. At night (i.e., from sunset to sunrise) any airplane in flight or maneuvering on the ground should carry the following lights:

A white light in front—visible at a distance of at least 8 kilometers (4.9 miles) and throwing its light forward.

A green light on the right side which throws its light forward.

A red light on the left side which throws its light forward.

A white light at the back which throws its light to the rear and can be seen for a distance of five kilometers (3.1 miles).

12. Flight over Paris and its surroundings is strictly forbidden except at altitudes above 2,000 meters (6,562 feet) for single-motored planes and above 1,000 meters (3,281 feet) for multi-motor planes and in general over all cities or villages at an altitude less than that permitted for landing of plane with a dead motor outside such congested areas.

REGULATIONS APPLYING TO LE BOURGET-DUGNY FIELD

1. *Signal equipment.* The Airport of Bourget-Dugny (civil and military) has at its disposal a means of signaling:

Two masts; one belonging to Civil Aviation (east side of the field), the other to the 34th Regiment of Aviation (south side of the field).

Six wind cones distributed evenly about the circumference of the airport. (Hangars and wireless masts.)

A movable "T" painted white (northeast corner of the field).

A white or black disk and a semaphore.

(*Continued on next page*)

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Model 276—Navy type, brown gloveskin, chamois leather lined. Each $5.50.

Model 274—Navy type as above, but with ear puffs. Each, $6.50.

Model 301—Soft coffee colored capeskin, soft leather lined. Each $5.50.

Model 303—Gray suede leather shell helmet, unlined. Each $3.00

Model 305 — Soft brown capeskin, unlined. Each $3.00.

Excellent Helmets at Popular Prices

Many students find it inconvenient to pay as much as $5.50 for a helmet. The models listed below may not be quite as handsome in finish and detail as the "Northeaster" but they are practical, perfect fitting helmets, made of soft capeskins, and we consider them to be the finest value in the country for the money.

Model 180—Soft brown capeskin, brown cloth lined. Each $3.00.

Model 181—As above, black leather. Each $3.00.

Model 125—Soft brown capeskin, chamois lined with ear puffs, Each $4.00.

White, Green or Red Helmets

Model 290—Made of the softest gloveskins, silk lined. Each $6.00.

Cloth Helmets

Model 273—White soft gabardine, unlined. Each $1.50.

Model 260—Tan soft gabardine, unlined. Each $1.50.

Model 272—Olive drab cloth gabardine, satine lined. Each $2.00.

All helmets supplied in the following head sizes 6¾, 6-⅞, 7, 7-⅛, 7¼, 7-⅜, 7½.

The articles on this page are sold by dealers everywhere, but if more convenient, send us your check or money order for the articles you want and you will receive your purchase by return mail, prepaid. If you do not find the merchandise superior in quality, comfort and appearance, return it to us and your money will be cheerfully and promptly refunded.

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2. *Signals.* Every mast carries, when the wind is below six miles per hour (approximate), a globe composed of alternating white and red flares.

In this case a large white panel on a black background in the form of a circle is visible on the Civil Aviation division at the side of the signaling mast, and a semaphore is placed horizontally at the top of the wireless mast situated in the northeast corner of the airport. The movable "T" is made to face the northeast.

3. The direction of the take-off and landing (during the day), except in cases of forced landings, the take-off and landing signals are:

For wind less than six miles per hour: a round flare of alternating red and white; a white panel of civil aviation and semaphore. Face to the northeast, (i.e., parallel to route to Flanders.)

For wind above six miles per hour: the round flare in a circle and the semaphore are both lowered. Face into the wind. (Indicated by the "T".)

4. The routing of the airplanes on the field.

There should be reserved along the periphery of the airport and in the proximity of the hangars, a neutral zone 150 meters (492.15 feet) in area for the ground maneuvers of the planes, except that on the northern border of the airport no such neutral zone is reserved. The central part reserved for take-offs and landings is limited by the interior perimeter of the zone and by the beacons parallel to the "Morée".

Take-off. Any airplane ready to make a take-off should place itself preferably in the neutral zone. When it shall have taxied in the zone reserved for take-offs and landings, it must do this in the direction for landing At all times, when the take-off run exceeds 500 meters (1,640 feet), the taxying airplane is authorized to cross the section reserved for take-offs and landings under the following conditions:

The run between the neutral zone and the point of the take-off shall be a straight line and perpendicular to the line of landings. During the its entire duration, the pilot shall observe the zone to the leeward both on the ground and in the air and shall stop his plane immediately if another plane is preparing to land or to take-off.

Once in position for a take-off, the pilot shall stop and assure himself that no airplane is preparing to land or is crossing the central zone. Right of way belongs to the plane which places itself first in the regular position.

Landings. After landing, the pilot must taxi directly to the neutral zone, running in the direction of landing up to the limit of the central zone. At all times, if the runway between the point of landing and the hangar exceeds 500 meters (1,640 feet), the pilot of the plane taxying on the ground is authorized to cross the part reserved for take-offs and landings under the following conditions:

After landing, he stops his plane without changing direction, assures himself that no plane is preparing to take-off in that part of the field which he wants to cross and then he proceeds at right angles to the direction of landing. In case when a plane is attempting to land or to take-off, the pilot who crosses the section reserved for departures and landings, shall stop his plane until the other shall have completed its landing or take-off.

RULES FOR NIGHT FLYING

1. The civilian airport of Bourget-Dugny closes normally three hours after sunset.

2. Facilities for signaling. The landing field of Bourget-Dugny (civil and military) has the following night signals:

A flashing searchlight of the naval type (in the northeast corner of the field) making a flash every three seconds; generally used in case of night flying.

A ground light (in the northeast of the field) showing the letter "N" every twelve seconds. These beacons are arranged to function simultaneously.

A neon tube light fixed on the same pylon as the revolving beacon.

A luminous "T" in the vicinity of the beacon.

Four projectors arranged in this fashion: Two at each side of the take-off runway; one movable floodlight situated in the center of the northern limit of the field; one double projector placed on the Military Aviation Section at the Middle of the Western border of the landing field.

Parachute flares in case of foggy or very bad weather.

Obstruction lamps illuminating through the entire night the buildings around the field and the long buoys of the Morée.

3. Signals.

I. Signals from the Planes

General Rules.

1. A plane desiring to land at night, and not forced to land, should demand authorization—

by making intermittant signals either with a lamp or a projector other than the navigation lights or with some sort of sounding apparatus:

by the motor exhaust in case of the nonfunctioning of the above means. Otherwise, he should reproduce by the aid of the Morse International Code and by means of sound or luminous signals the group of two letters designating one of the letters of his nationality and the other the last letter of his registration mark.

A plane obliged to land at night should before doing so, make a series of short and intermittant signals with its navigations flares.

Special rules for military planes

1. Besides the signals indicated above, a military pilot can ask to land by firing a green pyrotechnical flare; or, signal that he is obliged to land by throwing out a red flare which signifies "distress".

For the requests for permission to land made by military planes which do not posses letters of registration, the recognized signal shall be made by a series of dashes running from two to six such as will permit the distinguishing of five planes. The signs — —, — — —, — — — —, — — — — —, — — — — — —, shall be assigned to the pilots before every departure, by designation of the regiment.

Note: When making requests to land (civilian and military planes), the operations must be made slowly and the signals well separated in such a fashion that the last ones can be interpreted easily and without any possible confusion.

II. Signals of the Airport

1. When a plane has requested a runway, it is answered—

Free running: by lighting in green the Greek cross installed on the roof of the building marked "Administration," and by operating with it slowly several times and in visible Morse signals the identification marks of the plane which asked to land.

The indications of the plane are followed by intermittent signals of green color made with the aid of the Greek cross mentioned above.

The projectors shall be lighted and at the same time the Greek cross shall be lighted in red to forbid the use of the field by other planes.

No plane is authorized to land except the plane whose indications have been reproduced with the aid of the Greek cross; when the runway is free to be given anew, the red cross is shut off and the pilot who desires to land can ask for the field.

Field Occupied: A pilot landing, taking off or still obstructing the runway.

By lighting with a red and steady light the cross as is stated below, the signal signifying:

Forbidden to land. Whenever the pilot has motor difficulty and for that reason is obliged to land, he can use the aforesaid signals (short and intermittant signals with the navigation lights, besides the red flare for the military pilots).

The projectors are then lighted if they have not already done so and the red cross is continued in action in order to direct the attention of the pilot to the fact that there is an obstacle on the field and that it is necessary in consequence to be extremely careful.

4. Parking on the field. An airplane parked on the field the entire night after landing (accident, motor jammed) is lighted by three fiery red lamps placed around it.

5. Directions for landings. The landings at night should be made:

in the wind lower than six miles per hour: facing the southwest. In this case the normal lighted "T" is extinguished and an irregular stationary "T" is lighted and is pointed to the southwest;

in a wind above six miles per hour: facing the wind. In this case the irregular stationary "T" is extinguished and the regular mobile "T" is lighted.

6. At each night flight of the military planes, the 34th Regiment of Aviation shall detach an officer and place him at the side of the electrician of Civilian Aviation Section. This officer, in conformity with the general rules, shall indicate to the electrician the one or the several projectors which it is necessary to light.

It is he who shall direct the maneuvers, the

(*Continued on page* 211)

SAFE

on wet and muddy spring fields

SOFT ground holds no threat for planes equipped with Goodyear Airwheels. These great, pillowing wheels and tires combined roll easily over ground far too soft for any other type of equipment—just as they make it possible to come down safely on plowed ground, sand or snow in forced landings.

Goodyear Airwheels operate with 5 to 15 pounds pressure. They spread out with a broad, yielding contact when they meet the ground. They add greater cushion to every landing or take-off; make it possible for planes to get into the air more quickly in rough fields; shorten the stopping distance on landing.

It is almost impossible to drag a wing in a ground loop when planes are equipped with Airwheels. And because there are no wheels, there can be no wheel collapse. Airwheels mount directly on the hubs.

Goodyear builds the complete Airwheel, hub and brake combination. The brakes bring the plane to a stop with a sure, smooth, positive action and with unsurpassed safety.

Wind tunnel tests show that the streamline shape of Airwheels reduces wind resistance. Repeated landings with punctured casings show that they are as safe or safer than other types of tires.

For information or engineering assistance, in equipping your future ships, write Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.

GOODYEAR

EVERYTHING IN RUBBER FOR THE AIRPLANE

THE AIR SERVICES

CONTACT COURSES IN THE AIR CORPS

CONTACT courses will be established whenever possible for Air Corps officers and officers of other branches of the Army, according to an authorization of the War Department to corps area and departmental commanders to attach Air Corps officers in their commands to units of ground arms for brief periods and to attach ground arms officers to units of the Air Corps. The purpose of these courses is to develop tactical coöperation between the aviation and ground branches of service.

Air Corps officers who are detached from units of the Air Corps for this purpose will be allowed opportunities to qualify for and retain their flying pay status. The officers of ground arms attached to units of the Air Corps, as authorized, will not be placed on a flying status for pay purposes, insufficiency of funds preventing this. Their participation in flights while on such duty will be optional.

Corps area and department commanders will report on July 1 to the Adjutant General the number, rank and arms of officers detached under the provisions of these contact courses, and report their findings on the practicability and value of the plan.

PHYSICAL examinations of 211 cadets out of 247 in the graduating class of the U. S. Military Academy applying for commissions in the Air Corps next June were recently completed by a board of five flight surgeons under the supervision of Maj. C. W. Cummings. Seventy-nine of the cadets examined failed to pass the examination, according to members of the board which has been in session at West Point since February 3. Ninety-one cadets qualified for flight training, ten were previously accepted, and thirty-one had minor defects which must be waived by the Chief of the Air Corps before they will be admitted to the Air Corps flying schools.

Air Corps Photographic Course at Chanute Field

THE course in aerial photography which is conducted at the technical school of the Army Air Corps at Chanute Field, Rantoul, Ill., covers every phase of the subject from photographic chemistry to the study of mosaics and map making. Personnel of the Air Corps reside in the photo barracks while enrolled in this course. Study is organized so that the student progresses from the general and theoretical phases to the detailed and technical branches of photographic work.

During the first four weeks of the course students are taught mathematics, optics and photographic chemistry. The next two weeks are occupied with lectures on the making of negatives and the study of cameras, including the Graflex, the view camera and the various types of cameras used in aerial photography. Printing and enlarging are taught during the next two weeks with particular attention to the obtaining of the proper tonal qualities in a print.

After the first ten weeks the study of ground photography is introduced. This phase of the course covers a period of approximately six weeks, and includes composition and exposure portraitures. The next two weeks are devoted to lectures on lantern slides, copying and filtering. Mosaics is then studied for a period of about eight weeks during which the student is taught to make aerial photographs and arrange them to make a map on a given scale.

Formation flight of the 91st Observation Squadron over San Francisco Bay

AIR CORPS TRAINING FOR CIVILIAN FLIERS

SELECTED graduates of approved civilian flying schools will be granted entrance to Kelly Field, Texas, where advanced flight training will be given them by the United States Army Air Corps, according to a recent announcement of Air Corps officials. The students selected will be given the option of specializing in pursuit, bombardment, attack or observation training. Flying school graduates selected for military training will be required to meet physical, mental and moral qualifications for flying cadets.

Ten graduates of commercial flying schools will be selected by the War Department for training in the advanced training school of the Army Air Corps at Kelly Field, for a four months' course, commencing about June 15, to determine the feasibility of the plan of giving advanced military flying courses to candidates selected from civilian schools. These candidates will be selected from commercial flying schools which have received Approved School Certificates from the Department of Commerce to give courses leading to private, limited commercial and transport pilots' licenses.

The Government will not be obliged to reimburse either the schools or the candidates for any expenses incurred prior to the enlistment of the applicant in the Air Corps as a flying cadet. Those selected will be entitled to the regulation pay and allowances of a flying cadet upon enlistment. If candidates selected complete the four months' course successfully, they will be commissioned second lieutenants in the Air Corps Reserve with rating of airplane pilot. Funds permitting, they will then be assigned to duty for one year or more with a tactical unit.

AIR CORPS TO STRESS AVIATION MEDICINE

POINTING out that during the past few years there has been a regular decrease in flying casualties in the Army Air Corps resulting from structural failure, as compared with no decrease in the cause of casualties on account of the failure of pilots, a recent report of the War Department stresses the importance of aviation medicine in the organization of the Air Corps as a means of decreasing errors of personnel resulting in accidents.

Statistics recently compiled indicate that fifty-nine per cent of accidents in commercial flying, sixty-three per cent in the Army Air Corps, and seventy-four per cent in the Navy Air Service, are the result of the human element involving the pilot's error. An increase in the safety of flying during the past few years, according to the report, is the result of improvement in airplane construction, safety devices, systematic

(*Continued on next page*)

In Nicaragua CORSAIRS *helped make Marine Air History*

THE situation the U. S. Marines met in Nicaragua was not just one of revolutionists, bandits, outlaws. It was complicated by the character of the country itself—mountainous, jungle-covered, inaccessible.

Ideal for revolutionists—difficult for the Marines.

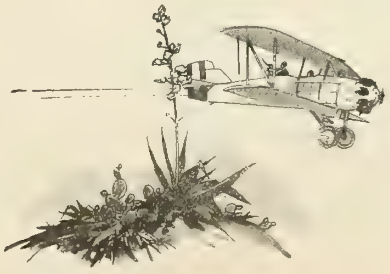
But the revolutionists had reckoned without *Corsairs.* The Marines had brought with them a squadron of *Corsairs,* of which *Corsair A-7532* was one. And it was not long before Marine officers learned that their *Corsairs* were the direct solution of most of their problems.

Corsair A-7532 was shipped directly from the factory to Nicaragua where is was assigned for duty with the VO-7M squadron. In Nicaragua the A-7532 and its sister *Corsairs* performed a multiplicity of duties—observations; light bombing; clearing out revolutionist ambush nests; even evacuation of wounded. All this keen performance under tropical, mountainous, difficult war-time conditions.

Only ships of climb—of maneuverability—of speed—of rugged dependability could perform day in and day out under such conditions. How Marine *Corsairs* performed in Nicaragua is a matter of record.

The *Corsair* is carving out a niche for itself in the history of Marine aviation. CHANCE VOUGHT CORPORATION, Long Island City, New York. Division of United Aircraft & Transport Corporation.

CHANCE VOUGHT CORPORATION



(Continued from preceding page)

training of pilots, and the thorough inspection of aircraft before every flight.

To secure pilots who are mentally and physically qualified, the Army Air Corps has placed importance on the intense development of aviation medicine as a means of decreasing the contribution of error in piloting. In the office of the Chief of the Air Corps there is a division of aviation medicine under the direction of a Colonel of the Medical Corps, and a School of Aviation Medicine has been established at Brooks Field, Texas.

MIAMI-FRANCE FIELD NON-STOP FLIGHT

A NON-STOP flight from Miami, Fla., to France Field, Canal Zone was completed on February 20 by four officers of the Air Corps, according to a recent report of the Chief of the Air Corps. The distance of 1,200 miles was covered in eleven hours, twenty-five minutes, the route followed being over water for practically the entire distance.

A Ford transport powered with three Wright Whirlwind engines of 300 horsepower each was used for the trip. The purposes of the non-stop flight was to deliver the plane from the United States to France Field without landing on foreign soil, to eliminate steamship charges incurred in shipping the plane, to continue the training of a group of Air Corps pilots in long-distance navigation, and to test equipment under the difficult conditions imposed in a flight of this nature.

The senior officer of the flight was Maj. Jacob E. Rickel. He was accompanied by Lieuts. Albert F. Hegenberger and Ennis C. Whitehead, pilots, and Sgt. Wilson, radio operator.

Radio Field Set Tested at Anacostia

TESTS of a radio field set were recently completed at the Naval Air Station, Anacostia, D. C. The set is entirely self-contained, motive power being supplied by a small four-cycle gasoline engine driving a direct current generator. This equipment is designed to be set up readily, and communication over the intermediate frequency band can be obtained up to a range of approximately one hundred miles.

AIR CORPS ORDERS 17 DOUGLAS PLANES

A CONTRACT has been placed by the Army Air Corps with the Douglas Aircraft Company of Santa Monica, Calif., for seventeen model 0-25A observation planes and spare parts amounting to $224,687.91. Funds for the purchase of these ships are available under the Air Corps appropriation for the fiscal year ending June 30, 1930. The planes which have been ordered under this contract will be equipped with Curtiss geared 1570 water-cooled engines.

Including this order, a total of fifty-three observation planes will be manufactured for the Air Corps by the Douglas company, thirty-six of these planes now being in production.

A FORD trimotor transport equipped as an ambulance plane will be stationed at Sacramento, Calif., for the annual field exercises of the Army Air Corps scheduled to take place during April, according to a recent announcement of the War Department. The ship will accommodate from four to six patients carried in specially constructed wire beds suspended on racks on the sides of the interior of the cabin and provided with straps to keep the occupants secure. The plane will be equipped with radio, surgical instruments, drugs and dressings, drinking and sterilized water, antiseptic solutions and splints. The crew will consist of two pilots, a flight surgeon and a medical attendant.

1929 Flying Time at Air Corps Advanced Flying School, Kelly Field

A TOTAL of 48,448 hours and twenty minutes of flying time was completed during 1929 at the Air Corps Advanced Training School, Kelly Field, San Antonio, Texas, by pilots and students stationed at the field, according to a recent announcement of the Chief of the Air Corps. The detachment of aircraft at Kelly Field covered a distance of 4,844,700 miles during this period.

Lighter-Than-Air Officers at March Field

SIX officers of the lighter-than-air branch of the Army Air Corps have been detailed to duty as students at the Primary Flying School, March Field, Riverside, Calif., and have started training with the March 1 class, according to a recent announcement of the Chief of the Air Corps.

Sgt. Paschal, Marine Corps, Receives Navy Cross for Nicaraguan Service

THE Navy Cross has been awarded to Master Technical Sgt. Archie Paschal of the Marine Corps for daring and skill displayed while on aviation duty in Nicaragua. During 1,040 hours of flying over mountains and unexplored jungles, Sgt. Paschal participated in attacks on hostile bandits and located and supported ground patrols. He carried 1,700 passengers and 840,000 pounds of freight over terrain where a forced landing would have inevitably resulted in fatalities, according to the citation.

NEW YORK SITE FOR NAVAL AIR RESERVE

NEGOTIATIONS for a site for the use of the Naval Air Reserve in the New York metropolitan district have been completed by officials of the City of New York with the Curtiss-Wright Airports Corporation, according to a recent announcement of the Navy Department.

Under the terms of the agreement effected, the Naval Air Service will have the exclusive use of a hangar and lean-to capable of housing at least twenty planes at Valley Stream, in addition to the use of the flying field and floodlights. The corporation will furnish heat, light and power. Facilities for seaplanes will be provided at North Beach, Bowery Bay and East River, N. Y. This arrangement has been made to insure facilities for the operation of all seaplanes and landplanes assigned to the Naval Air Reserves in the Metropilitan District.

U. S. NAVY RADIO AT OBALDIA, PANAMA

By J. F. H.

A FEW miles from the Colombian border in Panama on the Atlantic coast and two hundred miles down the coast from Colon, lies the town of Puerto-Obaldia where a United States Naval Radio Station is located. Three men are stationed there to watch after the population and keep those in the jungle-like interior in communication with the outside world. The station was established under the treaty of 1918 with Panama, in which the Navy agreed to erect radio stations for commercial use at remote parts of the interior so that the population separated from the rest of the world by water and an almost impenetrable jungle might be kept in touch with the capital.

Since commercial aviation became well established in the Canal Zone and Panama last July, the Navy has served a faithful and constant duty to the public at Obaldia by sending out weather reports twice a day to Colombian and Panama cities so that pilots, before checking out on their run, would know what kind of weather awaited them while flying over hundreds of miles of desolate shore line.

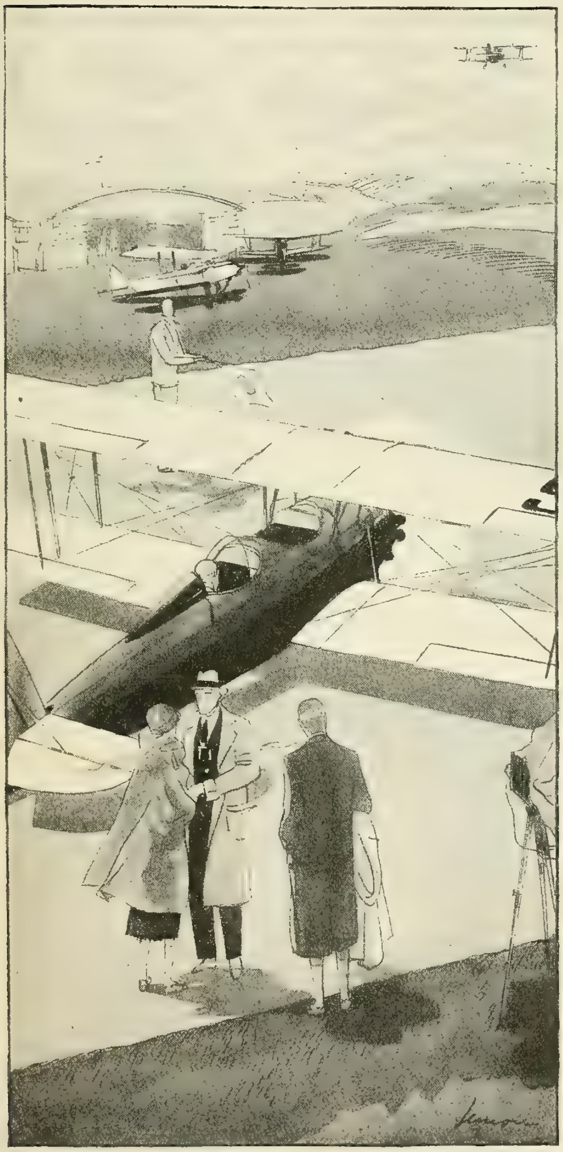
Between Colon and Cartagena, Colombia, for about four hundred miles down the old Spanish Main, Obaldia is the only settlement that has means of communication with the outside world, and, as the city is directly in the center of the long ocean hop, the station there is in a good position to aid aviation. The radio apparatus there is of the best in the United States Navy, and Balboa is reached and talked to frequently.

The three Navy men stationed there are proving invaluable to the cause of commercial aviation. They aid in making flying safe over difficult flying terrain where flying conditions change every half hour and rain squalls are so thick that a plane must sometimes climb 5,000 feet to avoid them, and winds are so intense that they keep the speed of planes on the route down to a minimum.

At present there are less than fifty inhabitants in Obaldia. They depend upon trading with the Indians for their existence. The United States has erected modern quarters for the men stationed at Obaldia, the most southerly station operated by the U. S. in the Western Hemisphere.

The pilots of commercial mail and passenger planes flying between Panama and the East Coast of South America are aided to a great extent by the Navy radio station and fly directly over this station when weather conditions permit. This is done so that the number on their wings can be read and reported to Balboa or Cartagena by the Obaldia station and their approximate position known at all times by the home stations.

WRIGHT SERVICE IS NEAR WHEREVER YOU FLY!



ASSEMBLED, tested . . . torn down, inspected . . . re-assembled and re-tested—each "Whirlwind" and "Cyclone" is proved before it leaves the plant. Yet here Wright's interest has only begun.

For Wright Service follows the engines wherever they fly! A chain of eighty-eight airport Service plants stretches across America. And the Wright owner, through these plants, keeps his Wright engine working as smoothly on the 2000th hour that he runs as he did on the day he got it.

This network is the result of steady growth under Wright's plan of keeping Service in step with advancing sales. It gives Wright engines the kind of painstaking attention and care that their fine workmanship deserves. It gives Wright owners factory service wherever they fly their motors.

And it does this at not unreasonable cost. For with 94 percent of all Wright parts fashioned at the factory to fit all three "Whirlwind" models alike, Wright service cuts costs without cutting corners.

And this, as much as any one thing, is the reason why Wright "Whirlwinds" many times have shown 150,000 . . . 200,000 . . . and more swift, dependable miles of flight in their remarkably long lives!

WRIGHT

AERONAUTICAL CORPORATION
PATERSON, NEW JERSEY
A DIVISION OF CURTISS-WRIGHT

WESTERN NEWS

W. A. E. AIRPORT TO BE DEDICATED APRIL 17

DEDICATORY ceremonies of the new airport of Western Air Express, constructed at a cost of approximately $1,000,000 at Valley Boulevard, Los Angeles, Calif., will be held on April 17, according to a recent announcement of officials of W. A. E. Invitation to participate in the ceremonies have been sent to all chambers of commerce in the State, the Army Air Corps and Naval Air Service, service clubs in Southern California, and to public officials and citizens.

The Los Angeles airport of Western Air Express is privately owned and will be used exclusively by the company for its operations. The improvements which have been completed at the field include a service hangar with a floor space of 54,000 square feet, a storage hangar with a floor space of 36,000 square feet, a passenger depot constructed at a cost of $100,000, a garage accommodating seventy-five automobiles, machine shops, and a building for employees which houses a power plant and offices for electricians. Present plans include the erection of another storage hangar and an additional garage.

April 17 has been chosen as the date for the dedicatory ceremonies of the airport to commemorate the fourth anniversary of Western Air Express which began operating in 1926 on the route from Los Angeles to Salt Lake City with five planes and twenty employees. At present the company operates a fleet of forty planes in regular service and has more than 400 employees.

Officials of Western Air Express have illustrated the growth of the company during the past four years by citing yearly mileage totals of planes operated by the company over regularly scheduled routes. In 1926 planes of Western Air Express flew a total of 328,892 miles; in 1927, 468,329 miles; in 1928, 946,660 miles; and in 1929, 2,216,610 miles. Up to February 1, 1930, Western Air Express craft had flown a total of 4,151,775 miles. No passengers have been injured and no planes have made forced landings as the result of engine trouble. At least one airplane has been in the air every hour of the day and night in scheduled operations of Western Air Express during the period of the company's existence.

"Waterplane" Developed at Alameda by James Robertson Shipyard

DESIGNED to give primary flying instruction, the "waterplane" has been developed by the James Robertson Shipyard, naval architects and marine engineers of Alameda, Calif. The waterplane is powered by a standard outboard motor and is equipped with a floating section and a cockpit above which wings have been mounted with standard airplane controls.

The waterplane is propelled by the outboard motor, the propeller of which drives through the water, the wings and floating section rising several feet above the surface of the water when the flying speed of the wing is reached. The power plant is at the rear of the mechanism to which it is connected by means of flexible arms and remains on the water at all times. The pilot banks on curves, rises off the water and levels out by means similar to those used in piloting an airplane.

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BOWLUS INCREASES SAILPLANE ACTIVITY

A TOUR of the Middlewest and the East for the purpose of promoting interest in motorless aviation will be made during April and May by William H. Bowlus holder of the American glider record of nine hours, five minutes and twenty-seven seconds. Mr. Bowlus will make exhibition flights at cities where glider clubs are being organized, using the Bowlus sailplane in which he set the American record.

The Bowlus Sailplane Company, Ltd., of San Diego, Calif., of which Mr. Bowlus is president, recently completed a program of organization and financing and started production of two sailplanes and two primary gliders per week. Sufficient capital has been provided for a proposed increase of production to five ships per day.

S. C. Breder has been appointed vice president in charge of sales of the Bowlus Sailplane Company and will appoint dealers and distributors throughout the country. Mr. Breder was formerly sales director of the Mahoney-Ryan Aircraft Corporation and the Lockheed Aircraft Company. Officers of the Bowlus company include Clyde Freeman, executive vice president and general manager; Harvey Atherton, secretary; Mardell Weber, assistant secretary; and I. N. Lawson, Jr., and Roy Campbell, Jr., directors.

Aero-Pacific Corp. Starts Operations at United Airport, Burbank

THE Aero-Pacific Corporation, newly appointed distributor of Waco airplanes for California, Arizona, and Nevada, has established headquarters on the United Airport in Burbank, in the greater Los Angeles area, where the airplane sales division is supplemented by departments of airplane and engine repair, supplies and accessories, and an air training school. E. E. Huse is president and general manager of the corporation.

United Airport consists of 234 acres having a six-directional runway system, an administration building, and four steel and

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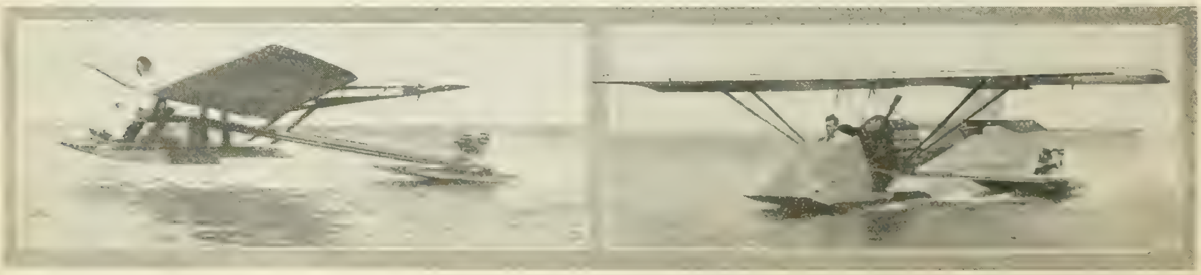


Open and enclosed cockpit models of the "Waterplane" in flight and alighting. The Waterplane was developed by the James Robertson Shipyard of Alameda, Calif., for primary flight instruction.

"AMERICA'S GREATEST AIR PASSENGER SYSTEM"...*Now Flies*

America's Largest Planes

WESTERN AIR EXPRESS, the pioneer, keeps the swift pace of leadership . . . assures continued dominance of the air lanes by introducing a fleet of Fokker F-32's to meet the demands of increasing traffic.

No larger ships, no liners more luxurious exist in America. The new Fokker F-32 represents the pinnacle of achievement in the entire industry.

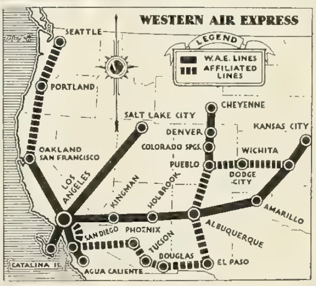
Its adoption by Western Air Express is but another expression of the policy of constant progress to which "America's Greatest Air Passenger System is dedicated.

New York Graybar Bldg.	OFFICES Kansas City	Chicago Palmer House

General Passenger Agent, Los Angeles

ATTENTION AIRMEN!

Even you who count flying as your "bread-and-butter" business have a new experience awaiting—when you ride in America's largest craft and inspect the many new features. Your appreciated custom of choosing Western Air Express for personal transportation now leads you to a rare treat next trip.



WESTERN AIR EXPRESS

. . . the Air Line that Airmen Choose for Personal Transportation

(*Continued from preceding page*)

concrete hangars now completed at an expenditure exceeding $1,500,000. Contracts for additional quarters are let. The hangar occupied by the Aero-Pacific Corporation accommodates twenty planes, with room for sales display, service and storage.

The Aero-Pacific Corporation maintains a full line of Waco planes for inspection and demonstration. Machinery to overhaul and rebuild engines and refinish and recover planes is installed, and a complete supply of parts is assembled. A course in flight training is offered at the field, with day and night technical instruction in Hollywood. Students qualify for motor and airplane mechanic's and pilot's licenses.

Twenty established dealers operate with the Aero-Pacific Corporation, which is equipped to service the 160 Wacos owned and in operation in the territory. A northern wholesale branch will be established shortly in the San Francisco Bay district, to be directed by R. D. Lose.

Mr. Huse, who directs all activities of the corporation, was formerly lieutenant in the Army Air Corps, business manager for Mutual Aircraft, and vice president and general manager of the American Aircraft. Associated with him as retail sales manager is J. A. Jarvis. J. L. Liscom is vice president; R. W. Gray, service manager. Stanley Fullmer directs the parachute department with complete equipment for servicing, inspecting and repacking.

Los Angeles Junior Chamber of Commerce Will Hold Glider Meet in May

THE First Los Angeles National Glider Meet will be held during a three-day period the latter part of May, according to a recent announcement of officials of the Los Angeles Junior Chamber of Commerce which will sponsor the meet. The event is sanctioned by the glider section of the Southern California chapter of the N.A.A. The program will include a glider tournament and demonstrations of glider flying.

The tournament will be preceded by a series of elimination contests held among the various clubs for the purpose of selecting contestants who will compete in the meet. Present plans include flights by powered gliders, hydro gliders, glider towing by lighter-than-air and heavier-than-air craft, and gliding and soaring contests for both sexes. Prizes will be awarded to the winners of the various contests, and the coöperation of glider manufacturers, glider clubs and civic organizations has been obtained by the chamber of commerce.

NEW FACTORY OF THE GRUSS AIR SPRING CO.

A TRIBUTE both to the growth of the airplane industry and the growing importance of Los Angeles as a western aircraft center was the moving last year of the Gruss Air Spring Company's factory to a new Los Angeles plant from their San Francisco location. This last of many moves in recent years necessitated by the constant rapid growth of the company, installs it in a modern, up-to-date factory completely re-equipped with the finest precision machine tools.

In this plant have been manufactured the heaviest duty airplane shock absorbers ever made in the United States—those installed on the Fokker F-32. These largest shock absorbers weighing fifty pounds each, withstand a load of 62,500 pounds, or more than thirty-one tons, each.

The plant equipment includes special Gruss-developed machines for swaging and spining of steel tubes, production turret lathe batteries, high-speed milling machines and drill presses, and a tool room equipped with complete ultra-precision tool, gauge, and die-making machinery.

CONTACTS

[F. E. SAMUELS]

AT the Emsco Aircraft plant at Downey, I recently had the opportunity of seeing the thirty-five passenger Emsco under construction. The big plane is nearly completed, being ready for its outside covering. It is powered by four Pratt and Whitney Wasp engines placed on top of the wing.

The plane has a wing spread of 112 feet. The average width of the fuselage is ten feet, and it has a length over all of seventy-eight feet. As a passenger plane it will have accommodations for thirty-two passengers, two pilots and a radio operator. The instrument board is being equipped with the latest instruments. The landing gear is equipped with Gruss Air Spring shock absorbers, and the radio plant is equipped for both receiving and sending. The plane was designed and is being built under the personal direction of Charles Rocheville, chief engineer of Emsco Aircraft.

CALIFORNIA'S high school and university aviation courses have been adopted as the national standard for all high schools, colleges and universities in America by the educational committee of the Aeronautical Chamber of Commerce, according to a recent statement made by Prof. Earl W. Hill, author of the California courses, member of the faculty of the University of California and educational director of Western Air Express. The textbook used in the course was written by Prof. Hill and James G. Wooley, vice president of Western Air Express.

THE Dawn aviation engine designed by Lee Bowman has shown very good performance, having had over 500 hours on the test block. One of the principal features of the design is the use of two pistons operating in a single cylinder, one piston serving as a moving cylinder head and imparting an upward pull on the crankshaft simultaneously with the down thrust of the lower piston. The combustion chambers between the pistons are adjustable, rendering the engine applicable to the Diesel principle. It is also claimed by Mr. Bowman that the motor is exceptionally cool in operation, and that the oil in the crankcase has never showed a temperature above 145 degrees.

Bach Sets Landplane Load-Speed Record

A NEW world's speed record of 142.66 miles per hour for landplanes carrying a payload of 2,000 kilograms (4,409.24 pounds) over a course of 100 kilometers (62.14 miles) was established on March 26 by Pat Fleming and Glen E. Oderik in a flight at the Los Angeles Metropolitan Airport, Los Angeles, Calif. They used a standard trimotor Bach airplane made by Bach Aircraft Company, Inc., at Los Angeles.

The flight was held under the auspices of the Richfield Oil Company and was officially observed for the National Aeronautic Association by Joseph Nikrent. The plane flew over a triangular course and carried a load of 4,422 pounds of sand in addition to the weight of the pilot and assistant. Mr. Fleming is chief test pilot of the Bach Aircraft Company.

LIEUT. W. B. HAWKINS has joined Ed. L. Erickson as partner in the Aero Brokerage Service Company at the Los Angeles Metropolitan Airport. During 1929 the Aero Brokerage Company sold over $150,000 worth of new and second hand planes, and the prospects for 1930 are even better. New offices are being fitted up in No. 1 hangar at the Los Angeles Metropolitan Airport.

ALL over this territory there is a great feeling and display of optimism in every branch of the aviation industry, now that the fog and rain has left us. Manufacturers of planes and motors are increasing their production schedules, sales prospects are coming into the different plants with great regularity, the passenger lists of the different airlines are getting bigger day by day, the student instruction branch is having a steady, healthful increase, short hops and passenger flights at the different airports are improving, and everyone is looking forward to a banner year.

(*Continued on next page*)

New Los Angeles plant of the Gruss Air Spring Company of America, Limited

CUSTOM
FINISH
TRI MOTOR
AIRCRAFT

BACH AIRCRAFT COMPANY, INC.
VAN NUYS, CALIFORNIA

(Contracts continued)

ANOTHER business alliance recently formed at the Los Angeles Metropolitan Airport is the forming of a partnership between Roy T. Minor, who has just returned from a month's tour in Mexico, and Howard F. Murchie, who has been operating a flying school at the field. The partners have the agency for both Great Lakes and Stearman aircraft at the port. This partnership should be productive of good results.

CALIFORNIA

GLIDER flying will be encouraged by the California State Chamber of Commerce, and the organization will do whatever it is able to do in the way of furthering interest in glider flying, according to a recent announcement of its officials. The board of directors of the State chamber has empowered its aeronautical committee to appoint a sub-committee which will make a survey of glider flying activities.

THE Kinner Airplane and Motor Corporation has appointed the Aero Corporation of California parts and service dealers for Kinner aircraft engines, and the shops of the Aero Corporation have been equipped to facilitate a day and night service on Kinner engines, according to a recent announcement of officials of the Aero Corporation. An order for engine parts totaling $10,000 has been placed with the Kinner company by the firm.

The Aero Corporation of California is parts and service dealers for Wasp, Hornet and Wasp Junior aircraft engines manufactured by the Pratt and Whitney Aircraft Company of Bridgeport, Conn.

NINE employees in the service department of the Richfield Oil Company of California have been appointed representatives of the company at airports located in New Mexico, Colorado, Kansas, Missouri and Texas. Each representative will be stationed at an airport where the Richfield company maintains facilities for the distribution of Richfield aviation oil.

The representatives appointed and the airports at which they will be stationed are as follows: Russell D. Cross, Amarillo, Texas; Leo Reilly, Dodge City, Kansas; George M. Moir, Wichita, Kansas; J. R. Seymour, Douglas, Arizona; W. R. Robertson, Pueblo, Colorado; D. H. Ernst, Albuquerque, New Mexico; and J. A. Savage, Denver, Colorado.

Activities at Ryan Airport, San Diego

THE T. C. Ryan Flying School at San Diego, Calif., recently added a second radio class to its student activities. This class, under the direction of John S. Ray, continues throughout each afternoon and gives the student instruction while not flying. Practical experience is given in sending and receiving messages so that students may familiarize themselves with this form of plane-airport communication.

The Pacific Technical University, in affiliation with the T. C. Ryan Flying School, has placed all parachute instruction under the direction of Archie Atherton, chief of operations for the Russell Parachute Company.

Statistics for 1929 which have just been compiled show that 4,755 trimotored planes carrying a total of 20,590 passengers arrived at and departed from Ryan Airport, San Diego, during 1929. During that period the airport was the San Diego base of operations for TAT-Maddux planes, as well as the Pickwick Airlines and Western Air Express. In addition to the above regular scheduled lines the T. C. Ryan Flying Service conducted 2,546 special charter trips from the field carrying 9,042 passengers. As the home of the T. C. Ryan Flying School, the activities of Ryan Airport were further augmented by 20,576 student landings and take-offs.

The commercial aeronautical activities of Ryan Airport were increased on March 1 by the inauguration of service by Standard Airlines using Ryan Airport as its San Diego base of operations. The airline operates trimotored Fokker F10s on its regular run between Los Angeles, San Diego and El Paso and brings two of these planes on daily schedule to Ryan Airport.

CONSTRUCTION of a new terminal depot has been completed at the El Paso, Texas, field of Standard Airlines, Inc. The building contains five offices for officials, a passenger waiting room, a radio tower and a baggage room. It was constructed to replace the depot which was recently destroyed by fire.

THE sum of $8,000,000 was expended for crop dusting from the air by owners of fruit orchards and grain fields in California during 1929, according to a recent report of Aero Dusters, a company engaged in aerial crop dusting in California. The airplane method costs less than the ground system, according to the company, as sixty times the amount of territory covered by a tractor can be sprayed by an airplane in a given time. More than 50,000 acres in Mexico were sprayed from the air by the company in 1929, and 1,000,000 acres have been contracted for throughout the Southwest during 1930.

[R. GRIGSBY]

AIR FERRIES, INC., will start a passenger line between San Francisco and Stockton, using six-passenger Loening amphibions, as soon as planes arrive from the factory. Planes will leave San Francisco at Pier 5, and land in Stockton Channel, in the center of the town, fifty minutes later. The fare will be $7.00 each way, according to an announcement of J. J. Tynan, president of Air Ferries, Inc.

THE American Legion post at Tracy, Calif., has built three new hangars at its airport, making a total of four hangars on the field. Bill DeVries, manager of the field, has secured the Eaglerock agency for all of California north of Bakersfield.

AIRCRAFT INDUSTRIES of San Leandro has built the first unit of a factory on the new Modesto, Calif., airport. It is an attractive building, and is at present being used as a hangar for all the planes at Modesto.

OAKLAND

FOUR additional instructors have been appointed by the Boeing School of Aeronautics, increasing the teaching staff of the ground and flying school of the organization at Oakland Municipal Airport to sixteen members. The new instructors recently appointed are as follows: Virgil Simmons, flying instructor; Edwin Ross, Fred C. O'Neill, and Herbert March, instructors in the ground school. Mr. March was formerly in charge of the maintenance staff of Varney Air Lines.

INSTALLATION of teletype printers along the airway between Oakland and Portland will be completed in a short time, according to D. M. Little, of the United States Weather Bureau, who is directing the work in coöperation with T. K. Johnson of the Department of Commerce, Aeronautics Branch. When this work is done, Oakland Airport will be the control point for the most complete airway weather reporting service in the nation. Oakland Airport now receives hourly weather reports from stations along the southern airway as far south as San Diego and along the transcontinental airway as far east as Salt Lake City. These reports are broadcasted regularly by the Department of Commerce airways radio station located near the Oakland Airport. The reports from the coastal airway to the north will be broadcast in similar manner from the Oakland radio station.

THE Boeing School of Aeronautics at the Oakland Airport, with 202 students now enrolled, plans an active expansion program. New classes in the Boeing master pilot and master mechanic courses are announced for April 7, July 1, and September 22, with a limit of forty students. Instruction in the master mechanic course has been increased from 1,008 to 1,224 hours and in the master pilot from 864 to 924 hours. There has been no increase in tuition rates. Blind flying instruction is afforded students in a plane with the front cockpit completely covered. Night flying is also given advanced students.

The downtown extension courses recently installed at San Francisco and Oakland have attracted a substantial number of professional men. Approximately one-third of Boeing students are fliers; the others are training in mechanical and informational courses designed to furnish specialized men and women for the ground organizations which operators, airplane manufacturers and users will require.

(Continued on next page)

EVANS *all steel* GLIDER

Safe

Durable

Airworthy

Economical

$247.50 Knockdown

Valuable
territories
are open
for
well qualified
DISTRIBUTORS

The superior airworthiness and maneuverability of EVANS gliders were emphatically demonstrated in the recent All-Western Glider Meet, where EVANS gliders won seven out of twelve places in primary type glider events . . . including first, second and fourth places in spot landing contest. These Gliders are built to give maximum safety, high performance and freedom from maintenance.

Spars and seat are the only parts constructed of wood. The fuselage, welded by licensed aircraft welders, is of high grade aircraft steel—completely finished. Aerotrus steel wing ribs come complete, ready to slip on spars. Fabric is sewed ready to pull on wings and dope. Bolt wings and tail surfaces to fuselage and rig for flying. All parts and materials with detailed instructions for assembling are included.

By buying your EVANS glider knocked-down, save $100.00 in cost and approximately 50% on freight charges. Order your glider now for spring training and be ready for participation in the coming glider events. 20% deposit to insure delivery and your glider starts on its way.

SPECIFICATIONS:

Primary type

Span	34 ft.
Chord	5 ft.
Weight	150 lbs.

Fuselage—welded tubular steel.

Empennage—all welded steel, fabric covering.

Wings—Aerotrus steel ribs, spruce spars, fabric covering.

Airfoil—Gottingen 441 (high lift).

Price — knockdown, $247.50; assembled, $347.50. (f. o. b. Los Angeles)

EVANS GLIDER COMPANY

Beaux Arts Building
Los Angeles, Calif.

(California news continued)

Elmer Davis has joined the Boeing School of Aeronautics faculty as instructor in communications work, lecture and laboratory. W. E. Beall, graduate of New York University, is instructor of avigation and meterology on the faculty. John E. Younger, Associate Professor at the University of California, has joined the lecture staff of Boeing School of Aeronautics, giving instruction on materials of aircraft fabrication and elements of design.

[H. V. WALDORF]

Air Ferries Transports 10,000 Passengers

A TOTAL of 10,000 passengers were carried by Air Ferries, Ltd., during the first 27 days of the Oakland-San Francisco airplane ferry service, according to a recent report of officials of the line. The service was inaugurated February 1.

The heaviest commuter traffic on the six-mile flight was on Sunday, February 16, when a total of 947 passengers were carried by the Loening amphibions used on the service. A total of 122 aerial crossings of the San Francisco bay were made to transport this number of passengers. The normal schedule, starting at 7.30 a. m. and ending at dark, calls for seventy-four crossings per day.

The service is to be extended to Vallejo and Stockton as soon as nine Loenings, recently ordered, are delivered. Landing facilities have been completed at the two cities. A feeder line between downtown Oakland and Oakland Municipal airport is also to be established. Extensive space has been taken by the company at Oakland Municipal Airport.

AIRPLANE passengers at Oakland Municipal airport, from September 1, 1927, when the flying field was officially opened for commercial operations, until February 28, 1930, total 110,248. Landings for the same period amounted to 182,248, and student flights 26,871.

These figures include the February operations, which were: Landings, 5,219; passengers, 2,738; student flights, 1,295; student landings, 3,219. A total of 376 students were taking flying courses at the airport during February.

A NEW monoplane wind tee, larger than the original one, has been installed at the northeast corner of the Oakland Municipal airport. Constructed by Aircraft Industries, Ltd., makers of the original tee, the new wind indicator has a wing spread of twelve feet and is sixteen feet in length. An added feature of the device is that by means of a counterweight the tee points in the direction of the prevailing wind in the event of a calm or of winds less than five miles per hour. The tee is lighted at night with neon lights along the top of the wing and fuselage.

AN extremely narrow propeller made of nickel steel is being tested at Oakland Municipal Airport by Livingston G. Irving. It was designed by Rachael and Joseph Jaccuzzi of Oakland. In preliminary tests the propeller is reported to have given Mr. Irving's monoplane an increase in speed of fifteen miles per hour.

STUDENTS of the Boeing School of Aeronautics at Oakland Municipal Airport flew a total of 52,500 miles during February, according to the records of T. Lee, Jr., general manager.

A survey has been launched by H. F. Lusk, dean of the school, to gather data on upper air conditions at Altamont Pass, about thirty miles from Oakland airport. The pass is noted for its steady winds. The survey is presumably a preparatory step for the establishment of a glider camp. Special instruments attached to kites are used in determining velocity, rate of up-draught, and direction of winds.

FOUR Air Corps Reserve fliers at Oakland Municipal Airport have received recent promotions. Those promoted include Livingston G. Irving, to the grade of lieutenant-colonel; and Franklin Rose, William Fillmore, and Johnny Johnston from first lieutenants to captains.

THE Aero Club of Northern California recently held an election at which Howard I. Porter was elected president, D. C. Warren, technical vice president, Robert Martland, Sr., organization vice president, and Rheule Reitze, technical secretary. The board of directors includes, in addition to the officers, T. Lee, Jr., Samuel Metzger, William P. Butler, and L. S. Nagle.

A GLIDER factory has been established in Oakland by Walter Woerner and Gordon Dobson, aeronautical engineers. Both training and soaring type gliders are made by the company.

THE teletype service, connecting Oakland Municipal Airport headquarters of the Pacific Coast network of upper air weather reporting stations with other units of the system, is being extended to Portland. Teletype services connecting the Oakland airport with San Diego and Salt Lake City are already in operation.

A SIXTEEN box fire alarm system is being planned by the Board of Port Commissioners for installation at Oakland Municipal Airport. The alarms are to connect with the Oakland city system. Eight interior and eight exterior alarms are to be part of the system. In addition to the alarm boxes, eight gongs will be placed at strategic points along the line of hangars.

BEGINNING May 1, passengers will be carried on the northbound Los Angeles-Oakland run of the Pacific Air Transport. Since the service was inaugurated in 1926, no passengers have been carried on this section of the coastwise service.

The section is flown entirely at night, starting from Los Angeles at midnight. Decision to take passengers on this run follows the completion of the United Airport at Burbank, the southern terminal.

ALAMEDA

[H. V. WALDORF]

UNDER the direction of Capt. William H. Royle and Fred Havel, a limited commercial ground school course has been started at Alameda Airport by the Curtiss-Wright Flying Service.

ALAMEDA Airport has been selected as the base of the fleet of planes operated by the western division of the Shell Oil Company. Extensive hangar space has been taken by the company at the Alameda field.

AWARDING of a contract for the construction of a 2,000-foot bulkhead is the next step in the development program at Alameda Airport. The work will cost approximately $100,000. The bulkhead will be part of the yacht harbor and seaplane base now nearing completion.

Filling operations at the flying field are progressing at the rate of 150,000 cubic yards a month. The original fifty-five acre landing area has been increased to 125 acres. The total acreage under lease by the Curtiss-Wright Airports Corporation is 346. The work is scheduled for completion next year.

To mark the power lines on the north side of Alameda Airport, a line of obstruction lights has been added to the night lighting equipment.

SUCCESSFUL test landings have been made on the recently completed runways of the San Francisco Bay Airdrome by the Standard Oil Company's Ford trimotor. The airdrome, one mile east of Alameda Airport, is nearing completion, and is scheduled to be placed in operation as the Western Air Express and West Coast Air Transport Corporation terminal within a few months.

LOS ANGELES

A NEW paint plant which will distribute products in the Western United States, Latin America and the Orient will be established at Los Angeles, Calif., by the Arco Company of Cleveland, Ohio. The plant will consist of three brick buildings with a floor space of 16,500 square feet and the output will include the Arco Company's line of paints, lacquers, varnishes and enamels.

A DEVICE designed to eliminate excess wear of cylinders and ring grooves has been developed by Walter A. Hamilton, vice president in charge of mechanical operations of the Aero Corporation of California. Facilities for the manufacture of the device have been installed at the shops of the Aero corporation at Los Angeles.

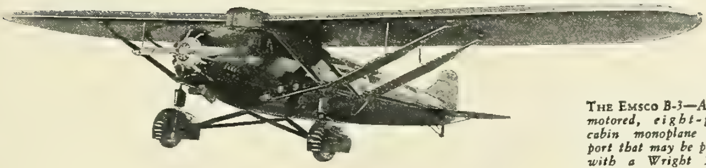
The device is known as the top side intake for aircraft engines and is designed to eliminate dust particles and dirt from entering the carburetor, the carburetor intake air being secured from the top side of the engine cowling. The intake air is led to

(Continued on next page)

E M S C O

A COMPLETE LINE OF AIRCRAFT FOR LAND AND SEA

The Emsco Cirrus—*A two-place, sport and training, mid-wing monoplane, powered with a 95 h.p., four-cylinder, air-cooled American Cirrus motor.*



The Emsco B-3—*A single motored, eight-place, cabin monoplane transport that may be powered with a Wright 300, a Pratt & Whitney Wasp or Hornet engine.*

The Emsco Challenger—*A tri-motored, eight-place, cabin monoplane, built to the same specifications as the B-3, except that it is powered with three Curtiss Challenger engines of 170 h.p. each.*

EACH A LEADER IN ITS CLASS

Engineered on sound principles that have been proven by years of experience in commercial and military aeronautics.... Built by master craftsmen in a new $1,000,000 factory equipped with the most modern approved production methods....These three types of Emsco Aircraft are proving every day their superiority in providing safe air transportation with greatest economy.

The Emsco Cirrus has flown cross-country under normal flying conditions with a fuel consumption of only 4.8 gallons per hour at cruising speed. Twice the 3-B, powered with a 300 h.p. Wright Whirlwind has taken off a gross load of approximately 10,000 pounds with a run of a half mile. The Emsco Challenger has demonstrated its dependability, safety and economy by flying more than 25,000 miles under all conditions, within the last four months.

In addition to these, the Emsco Aircraft Corporation has under construction at this time four new and distinctive types of planes, which, when completed and added to the present group, will make the Emsco line one of the finest and most complete in the industry today. These four include:

(1) a four motored plane carrying thirty-two passengers, two pilots and radio man; four Wasp motors—tandem; designed for all weather conditions and altitude flying, also offering economical transportation.

(2) The Emsco Amphibian—a bi-motored eight place, streamline; metal designed; built for heavy duty transportation.

(3) The Emsco Mail—a single motored monoplane; built for mail, express and freight; fast performance with a pay load of 1200 pounds.

(4) A special long range monoplane—extremely streamlined; designed for record distance flight.

All Emsco land planes are delivered from the factory with pontoon fittings so that no structural changes are necessary to quickly adapt them to seaplane work. The B-3 may easily be transformed into a tri-motored plane as fittings for outboard motors are standard. Structurally the planes are identical.

Complete specifications, performance data and prices will be forwarded on request.

EMSCO AIRCRAFT CORPORATION ◆ DOWNEY ◆ LOS ANGELES COUNTY ◆ CALIF.

(*California news continued*)

the carburetor by means of flexible tubing which filters the air passing through.

C. N. JAMES has been appointed assistant general superintendent in charge of flying personnel and dispatching for Western Air Express. Mr. James was formerly air mail pilot for the Western company on the night run between Los Angeles and Salt Lake City and was a member of the flying personnel of the Western company when it first inaugurated service in 1926.

AN aerial tour of Mexico, Guatemala, El Salvador, Honduras, and Nicaragua has been completed by F. M. Deeds, general manager of Simmons Aircraft Division of Steel, Inc., of Los Angeles, Calif. The trip required three months to complete and activities of the tour included surveys of transport routes, flying schools and military aviation in the countries visited. The surveys were made in the interests of aircraft and aeronautical manufacturers for which the Simmons company is export distributor. Mr. Deeds flew a Butler Blackhawk on the trip and was accompanied by R. W. Grigsby, test pilot for the Spartan Aircraft Company, who flew a Spartan C-3 biplane.

A PLAN under which flying lessons may be arranged by appointment was recently adopted by the Standard Flying Schools, division of the Aero Corporation of California, Los Angeles. The system was introduced in the school to enable business and professional men to take flight training. Lessons are given at the field of the Aero corporation and each session requires about thirty minutes to complete. Appointments may be made by phone.

THE Dycer Airport Solo Club recently purchased a Lincoln P-3 plane and began operations at Dycer Airport, Los Angeles, Calif. The first unit of the club has been formed with eleven members. They are C. H. Dunn, Pat Paola, Charles Dirmeyer, J. V. Hickey, Lee Williams, Howard Simmons, E. T. LaChalle, L. L. Smith, Jack Stewart, A. W. Hall and Charles Emerson. Activities of the club include solo flying and flying instruction.

Dycer Airport has been appointed distributor for the Lincoln Aircraft Corporation. A tour of California to demonstrate Lincoln planes was conducted by the Dycer Airport firm during March. A temporary base of operations will be established at Oakland Airport until a dealer for Lincoln planes in that territory has been appointed.

A WEEK-END and excursion service from Los Angeles, Calif., to Death Valley and return has been inaugurated by Curtiss-Wright Flying Service, according to a recent announcement of Major C. C. Moseley in charge of western operations for the Curtiss-Wright organization. The service was arranged in conjunction with Furnace Creek Inn at Death Valley and includes an all-expense two-day visit. Ford trimotor planes are used on the service.

Jack W. Duelks, Sales Manager of the Earl Aviation Corp. of Los Angeles

THE appointment of Jack W. Duelks as sales director of the Earl Aviation Corporation of Los Angeles, Calif., was recently announced by officials of the company. Mr. Duelks was formerly affiliated with the Aero Corporation of California and the automotive industry.

The directors of the Earl Aviation Company are: J. Danner Bunch, president; A. M. Kinstler, vice president; C. M. Petty, secretary-treasurer; and Caffee Earl, chairman of the board.

Richfield Supplies Fuel and Oil for Air Corps Exercises at Sacramento

RECEIPT of a contract from the United States Army for 5,000 gallons of aviation lubricating oils and 130,000 gallons of Ethylized aviation gasoline by the Richfield Oil Company of California was announced March 24 by C. B. Garretson, vice president in charge of Richfield refined products. The contract calls for immediate delivery to Mather Field, Sacramento, of the oil and gasoline to be used by the Army Air Corps for the annual field exercises to be centered from that field from April 1 to 24.

Approximately 150 various type planes will participate in these maneuvers, including nineteen bombardment and one cargo plane of the Second Bombardment Group, Langley Field, Va., twenty-eight attack and one cargo ship of the Third Attack Group, Fort Crockett, Galveston, Texas; forty pursuit and four cargo planes of the First Pursuit Group, Selfridge Field, Mich., twenty-six pursuit, four bombardment and two cargo planes of the Seventh Bombardment Group, Rockwell Field, San Diego; and seven observation and one cargo plane of the Ninety-First Observation Squadron, Crissey Field, San Francisco. These planes will be manned by 156 aviation officers and 154 mechanics of the Army Air Corps. The maneuvers will be the most extensive of their kind ever held in the United States in so far as diversified battle problems are concerned.

EARNINGS of Western Air Express were fifty per cent greater in 1929 than in 1928, according to a report of the company's activities in 1929 made by officials of Western Air Express. Gross revenues for 1929 were $2,950,921.59, representing a profit of $1,087,852.60 before Federal income tax was deducted. The profit of the company in 1928 was $720,777.80.

Daily mileage flown by passenger and mail planes operated by the company in 1928 totaled 2,400 miles; daily mileage at the end of 1929 was in excess of 7,200 miles. This increase in daily mileage effected in 1929 was distributed as follows 2,860 miles on the Los Angeles-Kansas City passenger service; 1,200 miles with the inauguration of night air mail service between Los Angeles and Salt Lake City; 730 miles resulting from doubling of the schedule on the Los Angeles-San Francisco passenger service, and 200 miles resulting from the establishment of a daily service between Los Angeles and Agua Caliente. The expansion of operations resulted in an increase of 300 per cent in the number of employees of Western Air Express; the establishment of a new airport at Valley Boulevard, Los Angeles, and the leasing or purchasing of landing fields at intermediate points along the route of the new lines which were established during the year.

Directors of Western Air Express for 1930 recently elected include the following: Harry Chandler, W. M. Garland, W. R. Fawcett, Harris M. Hanshue, J. A. Talbot, R. B. Hale, Thomas Kearns, Jack Frye and Guy Witter.

GEORGE M. LORD has been appointed general passenger agent by Western Air Express, Los Angeles, Calif., according to a recent announcement of officials of the company. Mr. Lord has been affiliated with the Western company for a period of two years, having been formerly assistant general passenger agent in charge of territory east of Kansas City.

THE Axelson Aircraft Engine Company of Los Angeles, Calif., recently cooperated with Bullock's Los Angeles department store and Silverwoods, men's clothing store, in organizing an aeronautical display for the public. Included in the aeronautical exhibits were an Axelson Type B airplane engine, and a showing of the parts of the engine including crankcase, cylinder heads, Stromberg carburetor and Scintilla magneto.

DOUGLAS KEENEY, instructor in the ground school of the Standard Flying Schools, Los Angeles, Calif., has been promoted from the grade of first lieutenant to that of captain in the United States Air Corps Reserves, 479th Pursuit Squadron. He has been affiliated with the Standard school since July, 1929, when the school was approved by the Department of Commerce.

A FOKKER trimotor operated by the Rio Grande Oil Company, Los Angeles, Calif., recently completed a total of 500 hours in the air during a period of nine months in which the plane has been used in the service of the company. During this

(*Continued on next page*)

RUSSELL "*Lobe*"

Cotton Canopy

PARACHUTE

now only

$250

Note These Outstanding Advantages

The Russell "Lobe" type *cotton canopy* Parachute resists mildew. . . . . It will not chafe. . . . . It resists cord burns—and lasts just as long as a silk parachute. The Russell *cotton* Parachute weighs only 2½ lbs. more than a parachute made of silk.

The Russell *"Lobe"* type of Parachute has only 1/3 the opening shock, or strain, of other types of parachutes.

The special cotton material used in Russell *cotton canopy* Parachutes is fully 2/3 as strong as silk. This means that the Russell *cotton* Parachute is more efficient, or has a greater FACTOR OF SAFETY, than other types of parachutes constructed of silk.

Exhaustive Tests Prove This

THE RUSSELL "LOBE" PARACHUTE with a *cotton* canopy is a safe parachute at a sensible price. The Russell "Lobe" Parachute with a *silk* canopy has many superiorities over other parachutes on the market—and costs no more than other types.

Whether you purchase a cotton or a silk Russell "Lobe" Parachute, you get the new comfortable pack, with adjustable harness and back-pad which enables you to fasten and unfasten the parachute while seated in the cockpit. All Russell "Lobe" Parachutes are convenient, safe—and remarkably comfortable.

RUSSELL PARACHUTE CO.

Factory and
Western Sales Office
1202 Kettner Blvd.
San Diego, Calif.

Eastern
Sales Office
122 E. 42nd St., New York

DEALERS EVERYWHERE
Write for Descriptive Folder and
Name of Nearest Dealer.

(California news continued)

period the plane flew 60,000 miles and carried 1,929 passengers. The longest one-day flight of the Fokker was from Los Angeles, Calif., to Wichita, Kan., a distance of 1,295 miles flown in eleven hours at an average speed of 118 miles per hour.

A SPECIAL aviation course for the training of pilots in crop dusting which is the only course of its kind in the country has been started by the Standard Flying School of Los Angeles. The course includes intensive training in the piloting of crop dusting planes over crops and foliage at an altitude of not over twenty feet, and at the same time operating the dusting apparatus which is built into the planes. A thorough study is also given in the chemicals used in this process and their effects on the various species of insects and crop parasites.

Portable Landing Light Developed by Airtech School of Aviation

A PORTABLE field landing light has been developed by the Airtech School of Aviation, San Diego, Calif., for the purpose of lighting the field of the school during the instruction in night flying given to transport students. The light is mounted on a four-wheel trailer and can be towed by a motor driven vehicle at speeds up to fifty miles per hour.

The light was developed from a Navy arc searchlight which the school purchased and equipped with an incandescent 32-volt lamp, producing a beam of 1,000,000 candlepower. Crouse-Hinds lenses and louvres were installed. Power for the light is furnished by a 300-ampere electric generator mounted on a truck and driven by a six-cylinder automobile engine.

In addition to furnishing power for the landing light, this generator is used to operate a string of signal lights used in communicating with planes flying above the field, and twenty-two lamps indicating landing area boundaries.

ARIZONA

[H. G. WILSON]

PRELIMINARY surveys on mapping the southern transcontinental airway through Southern Arizona were done during March by L. C. Elliott, airways extension superintendent of the Department of Commerce. He was accompanied by C. R. Burnett, mechanic, and made Tucson Airport his headquarters for the work. Beacon lights will be placed at ten mile intervals along the route designated, and emergency landing fields with boundary and other lights will be placed at thirty-mile intervals. Mr. Elliott recently completed mapping the Brownsville to Houston portion of the Mexico City-Washington air route.

THE Scenic Airways "Sky Harbor" at Phoenix may be purchased by the City of Phoenix, according to plans now being developed. The company proposes to take the old municipal field as part payment for the larger, better improved, landing field. A formal call for bids on the municipal field, which is practically undeveloped, is being made as a preliminary step.

A PASSENGER line from Yuma to the Gulf of California is being considered by Bud Wilson and Bill Angels, who operate a flying school and air service at Yuma. Mr. Wilson has just been granted his transport license.

AJO Airport, which was recently declared a port of entry, will be dedicated April 5. Army, Navy and commercial planes are expected for the dedication, at which Gov. John C. Phillips has been asked to speak. Considerable international traffic passes through this port, which is near the fishing resorts on the Gulf of California.

INSTALLATION of beacon lights over the Western Air Express line through Northern Arizona has started, a contract for the work having been granted Lon Foster and Ray Dimmick, of Kingman. The installations will be made at a cost in excess of $30,000.

ADDITIONAL lights for the Tucson, Ariz., municipal airport, which will bring the fields lighting equipment to AIA standards, have been purchased. Bids have been called for the construction of an air depot and administration building at the field

(Continued on next page)

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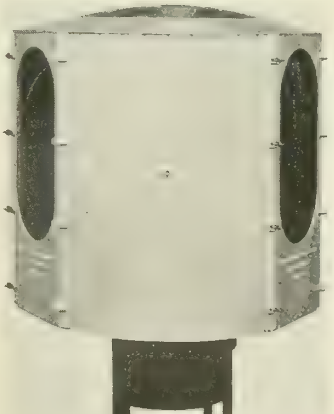
FOR AIRPORTS and AIRWAYS



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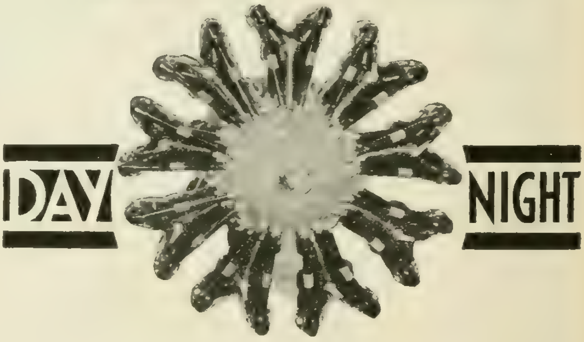

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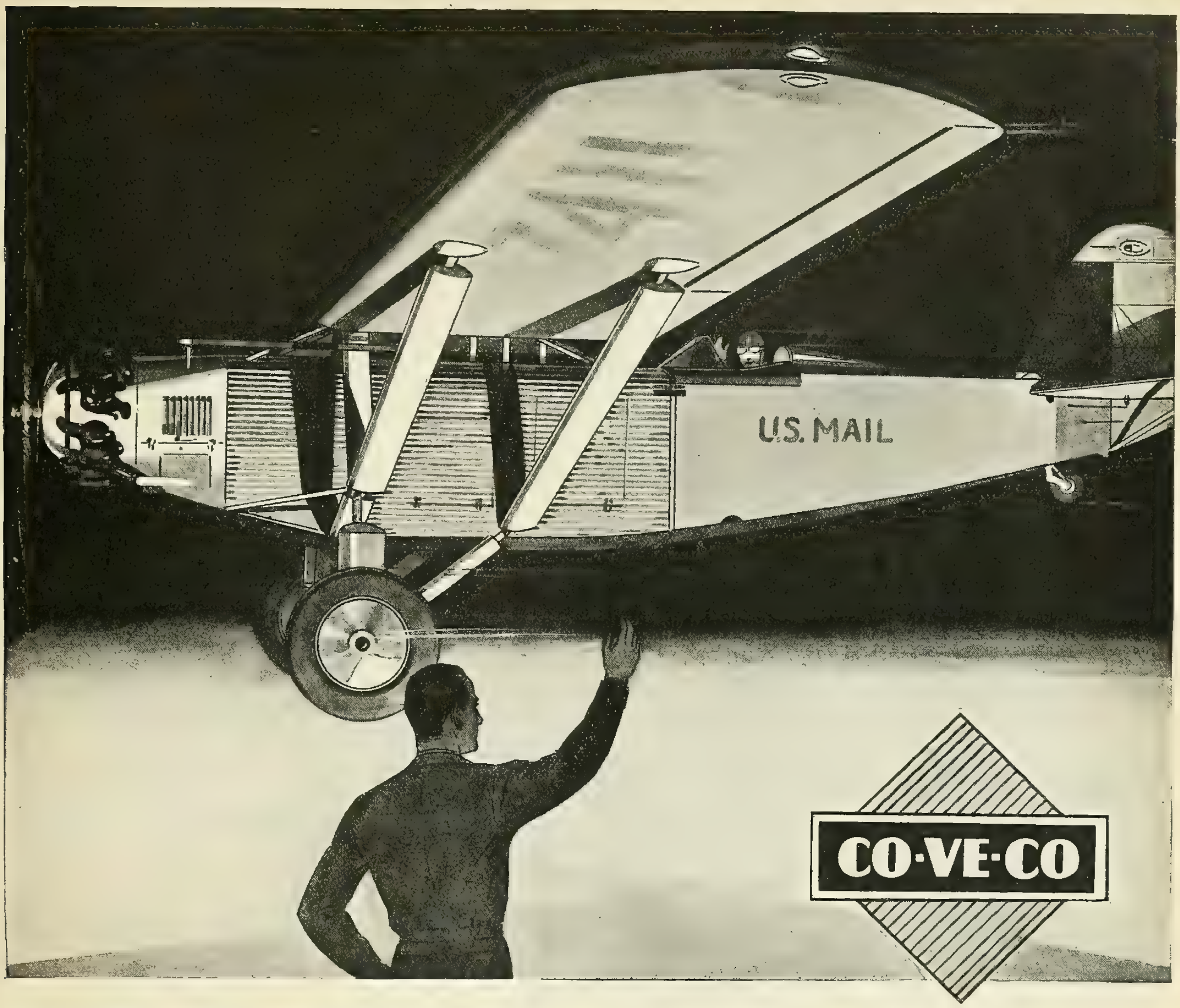

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TRAVEL BY AIR . . . FLY YOUR MAIL AND EXPRESS

(Arizona News continued)

and considerable work is being done on smoothing the field and laying the dust. Approximately $35,000 is to be spent on the airport during the present year.

Sgt. R. L. Andrick, in charge of Tucson Municipal Airport, which is also a Government field on the U. S. Army model airway, is preparing for a rush of business the early part of April, word having been received that 150 army planes will land there en route to the aerial maneuvers in Imperial Valley. All types of military planes from fields in the South and East, will stop for refueling.

THE Doupe-Greene Flying Service, which has been operating on the International Field at Nogales, Ariz., has moved to the Johnson field on the Nogales-Tucson highway, having obtained a twelve-year lease on that field. The organization has thirty-one students. The Scenic Airways school is operating on the International Airport under the direction of Lieut. Leslie Arnold and Charles Goldtrap. Nogales is served with two air pasenger lines, that of Pickwick Airways to Los Angeles and Mexico City, and the north-south daily passenger service of Scenic Airways.

COLORADO

DEDICATION of the airport at Gunnison, Colorado, now in the process of development, will be held some time this summer, according to a recent announcement of S. C. Boyles, secretary of the airport committee of the City of Gunnison. The committee recently completed the installation of a sign on the roof of a building in the center of Gunnison, the name of the city being in letters twelve feet high and the sign being one hundred feet in length.

The establishment of the airport at Gunnison is included in the plans for the inauguration of a proposed airline from Walsenburg over the Sangre de Christo Mountains at La Veta Pass to Almosa, up the San Luis Valley to Saguache and Gunnison, down the Gunnison Valley to Montrose, Delta, Grand Junction, Provo and Salt Lake City. This line would be established as a connecting link between Western Colorado and the Pacific Northwest.

THE Curtiss-Wright Flying School of Denver, Colo., was recently approved by the United States Department of Commerce. On March 5 this school received its certificate from the Department of Commerce approving its departments for private and limited commercial ground and flying instruction. The number of students now registered is eighty-eight of whom thirty-eight are flying students.

[I. R. ALEXANDER]

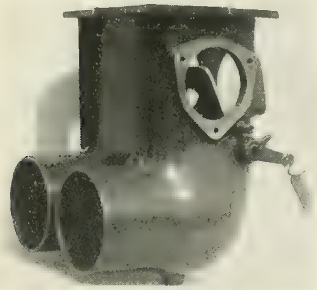
GOVERNOR ADAMS of Colorado during March re-appointed Dr. John Chase as a member of the state aeronautics board. Dr. Chase's new term will expire March 1, 1933. He was one of the original members appointed when the board was created and is an active member of the Colorado National Guard. Philip Henry Philbin, Jr., of Pueblo, Colo., was also appointed by Governor Adams as a member of the state commission on aeronautics. He succeeds Reginald Sinclair of Colorado Springs. His term expires March 1, 1932. Maj. Bruce Kistler of Denver is the third member of the board.

NIGHT flying conditions at the Denver Municipal Airport were approved recently by W. J. McKenzie, inspector of the United States Department of Commerce. Mr. McKenzie inspected searchlight and boundary light facilities at the field during a forty-five minute flight in a plane piloted by C. N. Bontrager.

FOLLOWING the report made by Clint Blauer, chairman of the committee working on the development of a proposed landing field for Brush, Colo., at a meeting of the American Legion in that city during the past month, it was recommended that the committee confer with Capt. Ralph Hall, chairman of the aeronautics division for the state on plans for the projected air-field. A tentative lease for the site of the landing field has been drawn and a preliminary survey of the ground has been made. The size and shape of the plot offer east-west and north-south runways of 1,275 and 975 feet respectively. The center of the field

(Continued on next page)

HAMILTON TOP SIDE INTAKE *for* Wasps Eliminates *the* DUST Normally Taken *in* Thru the Carburetor Causing Excess Wear of Cylinders and Ring Grooves



Easily adaptable by removing old style, open air scoop and installing new top side air scoop with flexible tubing. Its extra braces to the two lower cylinders add extra strength to the entire carburetor assembly. Recommended by Pratt & Whitney factory, this installation is now used on a number of established airlines with perfect satisfaction.

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NAME ADDRESS AGE

(*Colorado news continued*)

provides a landing area of more than 5,500 feet in diameter that may be approached from any direction.

PLANES of Midcontinent Air express, flying daily between Denver and El Paso and Denver and Kansas City, have traveled 510,820 miles in less than six months of operation without an accident to a passenger. Planes of the company are now flying 2,608 miles a day.

PLANS for an extensive expansion program in commercial aviation for the Rocky Mountain region were completed at a recent conference of managers of the Curtiss-Wright Flying Service, Maj. Bruce Kistler, Denver manager for the company, has announced. The proposed expansion program for the Rocky Mountain region includes the establishment of aviation schools in various districts and the purchase of a large amount of new equipment, which will be added to this district in the spring. It was also decided at this conference to begin work on a number of improvements at the Curtiss-Wright field in Denver, which will include the installation of a complete lighting system on the field and the construction of up-to-date runways.

AIR travel between Denver and the East has been speeded up by new connections at Kansas City. Arrangements now effective make it possible to leave Denver at 8 a.m. and arrive at St. Louis at 6:45 p.m. The connections are carried out by United States Airways, operating between Denver and Kansas City, and the T. A. T.-Maddux organization.

UTAH

[G. PERRINS]

AN aeronautical conference of governors of the eleven Western States, or their representatives, to work towards the securing of uniform legislation for the supervision of commercial flying, and to encourage further development of aviation, is being planned for Salt Lake City, according to Edison E. Mouton, supervising aeronautics inspector of the Department of Commerce for the eight western states. The conference will be similar to the one held in Boise in 1929 and is being called by the governor of Idaho through J. D. Wood, his representatives. Besides the governors and their representatives. Government airways officials, and civil aviation officials will attend the meeting.

IMMEDIATE steps are being considered to extend the National Parks Airways, Inc., route from Great Falls, Montana, into Canada, effecting an eight-hour service between Canadian points and Salt Lake City, according to Alfred Frank, president of the company. At the present time two days and two nights are required to cover the route by rail. Calgary, Regina and Lethbridge are cities being considered as the northern terminus of the service.

WYOMING

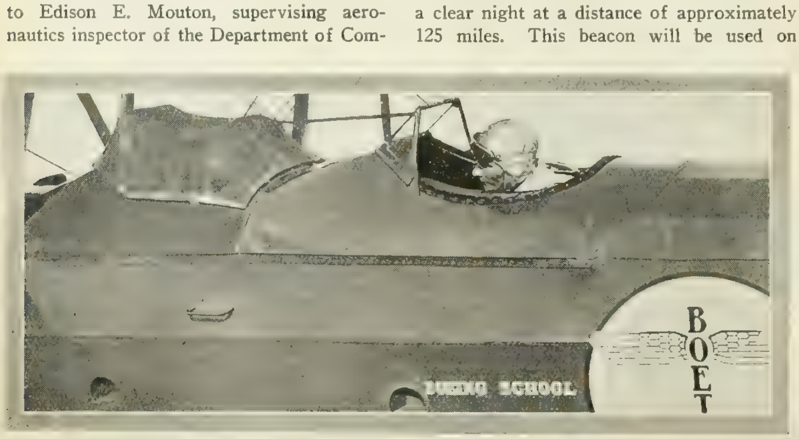
PLEDGING their immediate efforts to improvement work on the recently purchased airport land southeast of Sheridan, Wyoming, twenty leading citizens of Sheridan interested in aviation have formed a local chapter of the National Aeronautic Association. The meeting was called by George W. Scales, N. A. A. governor for Wyoming, who personally supervised the organization. He also is a member of the newly appointed Commercial Club airport and airways committee.

The local N. A. A. chapter will serve to generally stimulate interest in aeronautical activity in Wyoming.

COMPLETION of the development of an airport at Cheyenne, Wyoming, which will be used as a central base for transcontinental operations was recently announced by officials of the Boeing System. The company has acquired six buildings at the airport including a hangar with a capacity of nine trimotor planes or eighteen Boeing mail ships, and an administration building and passenger depot constructed at a cost of $68,000.

The company has installed at the airport a 500,000,000-candlepower beacon visible on a clear night at a distance of approximately 125 miles. This beacon will be used on stormy nights and is an addition to the field's lighting equipment consisting of a twenty-four-inch revolving beacon and a system of floodlighting which has been installed. An electric generating plant has been completed at the airport.

Under a revised system of operation which has been effected with the completion of the base at Cheyenne, a plane on the San Francisco-Chicago route will be flown to Cheyenne where its load will be transferred to another ship which will fly to Chicago. The Cheyenne base of the Boeing System will be used as an overhaul and division station



George Meyers of the Boeing School of Aeronautics in the plane used for blind flight instruction of Boeing private, limited commercial and transport students.

First Wyoming Glider Club Gets Charter

THE first glider club in the State of Wyoming, the Lander Glider Club at Lander, Wyo., was recently granted Charter No. 40 by the National Glider Association with a membership of twenty-six. The club, which is under the active leadership of Gerald Brooder, plans to engage in an extensive program of glider activity and will purchase primary and advanced types of motorless craft for the instruction of its members.

The officers of the club include Gerald Brooder, president; Hugh Spangler, vice president, and R. LeRossignol, secretary and treasurer. Arrangements had been made to procure a preliminary glider for training purposes and that the club plans to purchase advanced types suitable for work in high altitudes. The first glider was delivered in March and instruction to members of the club was started.

A location for the gliding activities will be chosen near Lander. Among the members of the club experienced in aviation is Gerald Brooder, who attended Ryan Aircraft school, San Diego, where one of his instructors was Hawley Bowlus, holder of American glider record. Walter S. Clute, another member, was a pursuit pilot with the rank of a second lieutenant in the Army Air Corps at March Field, Calif. Charles Cheatham has had flight training at Wichita Falls, Texas.

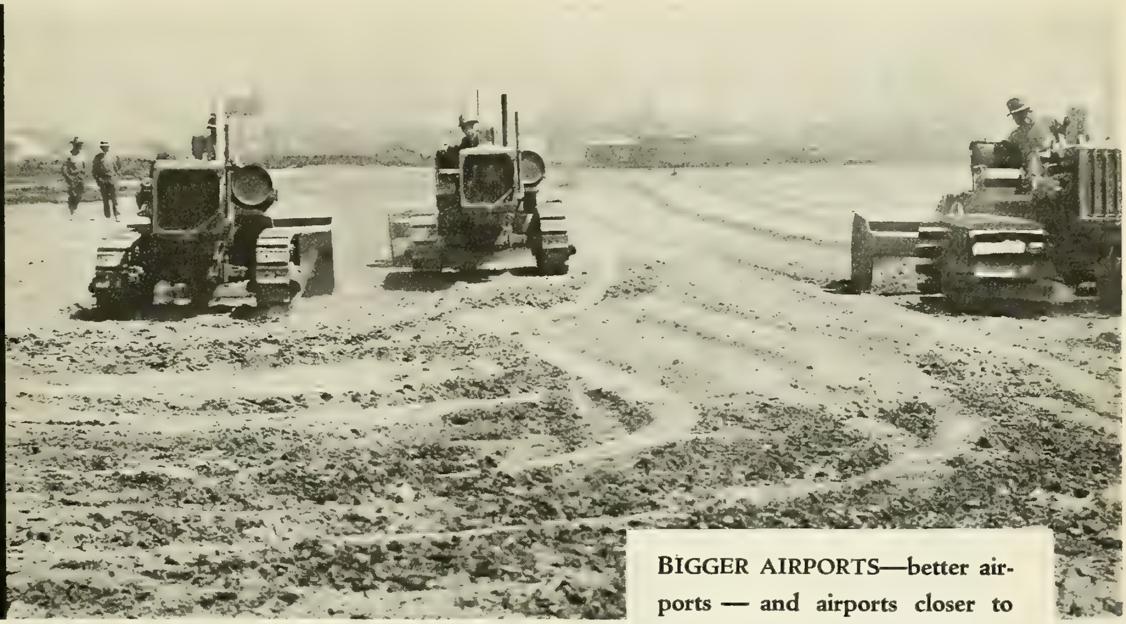
Included in the list of charter members of the new glider club here are E. D. Edwards, president of the Lander chamber of commerce, Mayor August Dupont, Frank Brooder, Floyd Scott, Lon Poston, Herbert Mackey, Richard F. Bender, Gerald Brooder, Chas. Cheatham, Walter Clute, Howard Epling, Fred Gaylord, Paul Gustafson, Harry F. Hays, Jimmy Hime, Dr. Paul R. Holtz, Dr. L. C. Hunt, R. LeRossignol, Lloyd Magar, Ronald McCoy, Keith Poston, Bernice Prideaux, John Smith, Alex Souter, Hugh D. Spangler, and Freck Trego.

IDAHO

[I. M. DURNIN]

ON March 1 Varney Air Lines, Inc., established divisional headquarters at the Boise, Idaho, airport. Flying activities between Salt Lake and Pasco, Wash., will be directed from the Boise office. The new

(*Continued on next page*)



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TRACTOR

(Idaho news continued)

arrangement, according to Leon D. Cuddeback, vice president in charge of operations, will mean that all pilots, now making their base in Pasco, will be moved to Boise. The mechanics of the company will also be increased at the Boise airport in order to take care of increased activities.

Mr. Cuddeback states that Walter Eefsen, has been named as his assistant, and will direct the flying operations between Salt Lake and Pasco, and that he will make his headquarters in Boise.

ANNOUNCEMENT was recently made that a radio beacon will soon be installed at the Burley, Idaho, airport. This beacon is to be intermediary between Salt Lake City and Boise. There are now intermediate landing fields at Strevell, Idahome, Burley, Jerome, King Hill, Mountain Home, Emmett and Weiser, with a terminal field at Boise. Taking into consideration the improvements now under way, it is thought that the Burley field will ultimately become a regular stopping point for Idaho airlines.

There are three landing fields in Cassia county, Idaho. Those at Strevell and Idahome are fully equipped with revolving lights and border lights. The one at Burley has a revolving beacon, and border lights are being installed. There are seven tower lights in the county, from fifty-one to eighty-seven feet in height. Each of these towers is also equipped with blinker lights which flash the number of the tower in code. The revolving beacons are set at intervals of ten miles along the course.

A. C. BLOMGREN, aeronautics engineer for the Idaho Department of Public Works, made a report recently showing the airways established in Idaho which have received official recognition. The main routes are: north and south from Weiser to the Canadian line via Lewiston and Moscow; across northern Idaho via Coeur d'Alene and Wallace; Pocatello to Burley connecting the air mail lines through those cities; Idaho Falls to West Yellowstone; Idaho Falls to Salmon; Pocatello to Salmon, via Arco; Mackay to Challis; Twin Falls to Wells to connect with air mail route; and Boise to West Yellowstone via Hailey, Arco, and Dubois.

WASHINGTON

UTILIZATION of Renton Airport at Bryn Mawr, Seattle, Washington, for storage and maintenance of airplanes by the Alaska-Washington Airways, Inc., was recently announced by officials of the Northwest Air Service, Inc., operators of the field. Two Lockheed planes have been stationed at the field by the airline company and a Stinson-Detroiter and a Lockheed will be added to the equipment maintained at the field. Passenger operations of the company will be continued at Roanoke. A total of fourteen planes are now housed at Renton Airport.

THREE passenger and mail planes have been shipped to the Peruvian government by the Boeing Airplane Company of Seattle, Washington, according to a recent announcement of officials of the company. The planes are of the 40-B4 type powered with Pratt and Whitney Hornet engines and will be used between the Peruvian seacoast and the interior. The planes will make in an hour and one-half a trip over mountain ranges intervening between the coast and the interior which requires twenty days by mule back, the method of transportation which the planes will be used to supplant.

[C. M. LITTLEJOHN]

THE question of the building of airports outside their city limits by cities in Washington was to come before the State supreme court sitting March 20th. The question was first raised by the city of Walla Walla in planning to build a new airport outside of her corporate limits, when difficulties arose between the city and the State auditor with reference to a bond issue of $50,000.

THE Boeing Airplane Company at Seattle has developed a low voltage, low amperage alternating current arc welder that permits welding of tubing and sheet stock ranging from .035 inch to .375 inch in thickness. Although torch welding is used to a limited degree in small sub-assembly work, the fuselages, landing gear and other steel structure are assembled by arc welding.

SITE for a new airport for Sedro-Woolley, Wash., was recently selected and approved by the Chamber of Commerce, the American Legion, and other civic bodies of Sedro-Woolley. The site is two miles northwest of the city and contains a large acreage.

TO fill its order of ninety pursuit planes for the Army Air Corps by May, the Boeing Airplane plant at Seattle has its production force working at full capacity. The new planes are the type P-12B, Wasp powered, incorporating many improvements over the P-12.

NORTHWEST

[F. K. HASKELL]

THE DeLong Construction Company of Spokane, Wash., recently purchased an Eaglerock equipped with a 225-horsepower Wright Whirlwind engine. It will be used in connection with the supervision of work on the dam they are building near Boise, Idaho. They are believed to be the first organization to put a plane to such use. Clare Hartnett will operate the plane.

ADDITION of Dexter Ralph Smith, for sixteen years professor of engineering at Oregon State College, to the staff of instructors at the Adcox Aviation School in Portland, was recently announced. Mr. Smith will have charge of the new engineering course of the school.

BRUBAKER Aerial Surveys of Portland has been awarded the Government contract for air photographic surveys of the upper Columbia River from the Canadian border to Pasco, and of the Grand Coulee canyon. The Columbia River work will be over a section 400 miles long and a mile and a half wide, while the Grand Coulee work will cover 240 square miles.

A CONTRACT for exclusive rights to ship flowers by air on daily schedule has been signed by West Coast Air Transport with W. R. Carter, wholesale florist of Portland, Oregon. The contract includes shipping rights over the route of West Coast Air Transport between Seattle, Portland, and San Francisco.

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- - - and NOW, *another leading oil company is*

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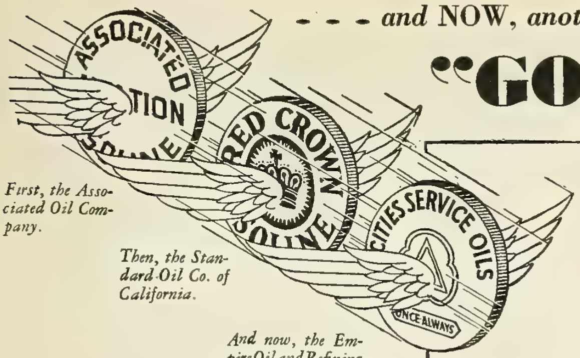


First, the Associated Oil Company.

Then, the Standard Oil Co. of California.

And now, the Empire Oil and Refining Co., subsidiary of Cities Service Company, has purchased a Boeing 40-B-4.

THE EMPIRE COMPANIES
BARTLESVILLE, OKLA.

CITIES SERVICE OILS
ONCE-ALWAYS

December 14, 1929

Boeing Airplane Company,
Seattle, Wash.

Gentlemen: Attention of Mr. Erik H. Nelson, Sales Mgr.

Just five months ago, the Empire Oil and Refining Co., subsidiary of Cities Service Company, purchased one of your 40-B-4 planes for commercial use.

The maiden trip of this "Cities-Service-Empire" Boeing from Seattle to Bartlesville, Oklahoma, or almost 2000 miles, was made without the slightest trouble of any kind.

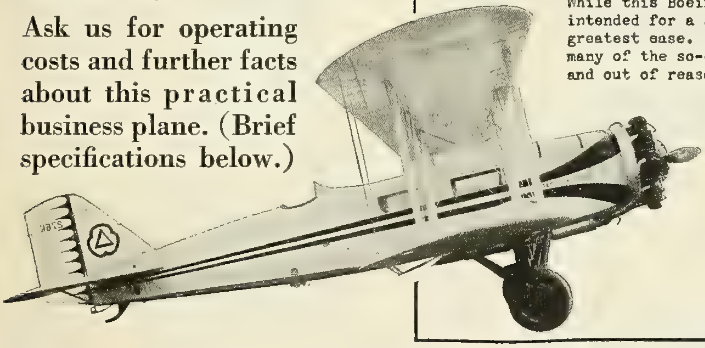
The impression of the ruggedness of construction gained during the three weeks' visit to your factory, prior to delivery, have been borne out during the few months we have been operating this plane.

While this Boeing was built for commercial use and was not intended for a stunting ship, it can be maneuvered with the greatest ease. Its performance compares favorably with many of the so-called "sport" planes. It can be taken in and out of reasonably small fields with full load, and it lands without the slightest rumble or jar. The beauty and performance of our Boeing bring favorable comments everywhere we go.

Yours very truly,
EMPIRE OIL AND REFINING COMPANY
AVIATION DIVISION
By Virgil D. Stone
Pilot

FOR the same reason that 50% of the nation's air mail is flown in Boeing planes . . . that's why these oil companies, and other progressive firms, are selecting the 40-B-4.

Ask us for operating costs and further facts about this practical business plane. (Brief specifications below.)



BOEING AIRPLANE COMPANY

Division of United Aircraft & Transport Corporation

SEATTLE, WASHINGTON

[*In Canada: Boeing Aircraft of Canada, Ltd., Vancouver, B. C.*]

PERFORMANCE

(Boeing Model 40-B-4 with full load)

Speed: High speed 138 m.p.h.; cruising speed 115 m.p.h. Ample reserve power. Cruises 4½ hrs. without refueling.
Quick Take-off; Slow Landing: Takes off in 12 seconds after 550 ft. run. Lands at 57 m.p.h.
Power Plant: 1 Pratt & Whitney 525 H.P. "Hornet" engine.
Actual Pay Load: 4 passengers, mail, and baggage (1163 lbs.)
Night Flying Equipment: Instrument board lights. Parachute flares and retractable landing lights.
Radio Equipped: Bonded, shielded, and wired throughout.
Fabric Covering: Permits speedy, economical, accurate inspection—a safety factor.
Completely Equipped: No extras to buy, no weight to add.
Special Features: Noise-proofed and insulated cabin. Oil cooler with shutter control operated from cockpit. Wheel brakes hand-operated. Adjustable pilot's seat and rudder bar pedals. Electric inertia starter.

VANCOUVER AIRPORT ON SEA ISLAND

DEVELOPMENT of an airport for landplanes and seaplanes on a 460-acre site at Sea Island, Vancouver, British Columbia, has been started, and the dedicatory ceremonies of the first unit of the airport will be held during July. Present plans include the development of the eastern half of the site, the western portion to be leased pending further expansion of the field. Tax payers voted the sum of $300,000 in 1929 for the development of the Vancouver airport.

Provision for the accommodation of landplanes and seaplanes in such a manner that all traffic can be controlled from a central administration building is included in the plans for the development of the field. The airport committee plans to dredge a long slough which cuts into the property near its center and develop a seaplane channel, the terminus of which will be a few feet from the administration building. The width of the arm of the Fraser River opposite the site was considered too narrow for north and south take-offs; however, this difficulty will be overcome by making the channel 1,300 feet in length to provide adequate take-off and landing facilities for seaplanes.

A landing stage and customs offices will be constructed at the end of the seaplane channel so that planes will be able to taxi to the customs offices and land passengers. The airport will be designed so that amphibions may land upon the water, taxi up a ramp and proceed to the main section of the airport. The ramp will be constructed of wood, and will later be supplanted with a 100-foot concrete slip. Traffic in and out of the channel will be regulated by signal lights on both sides of the entrance. Facilities for seaplanes will include a motor-boat house, dock and seaplane anchorage to be constructed this year.

When the airport is completed there will be a central take-off circle 1,000 feet in diameter in the center of the field. This circle will be of solid pavement and will provide a take-off area for landplanes. Five runways will extend from this circle in all directions except the south. This year only two of the runways will be completed, one 2,400 feet long, and the other, 1,900 feet in length, all runways being constructed of hard-surfaced asphaltic material. Incoming planes will land on the runways outside the circle and taxi to the hangars. The main runway will extend from east to west in the direction of the prevailing winds, and will be more than three-fourths of a mile long and 500 feet wide.

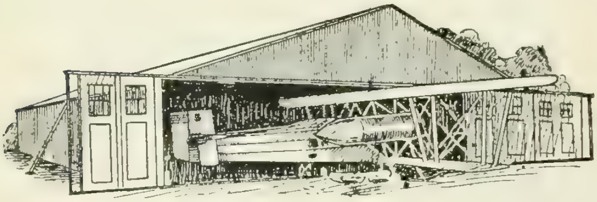
Plans include the construction of a 150-foot boulevard at the east edge of the airport, by means of which motor traffic will enter the field, in addition to a grandstand, parking space for 3,000 automobiles, club buildings, a hotel, hangars, repair shops, and an administration building. Hangar sites will be available to aircraft companies on long term leases, lessees being required to construct buildings in comformity with the general architectural scheme. A uniform style of architecture will be adopted for all of the buildings at the airport, and preparation of the plans for the buildings has been started.

The administration building, from which all of the activities of the airport will be controlled, will consist of three units, one of which will be constructed in 1930. This first unit will contain a waiting room, offices of the airport management, rest rooms and the Dominion weather bureau office. The second unit, scheduled to be completed next year, will contain a waiting room, restaurant, customs and immigration offices, and a control tower which will be constructed above the unit and which will direct planes on the runways and in the seaplane channel. The third unit of the administration building will extend outward toward the field and will contain additional passenger facilities.

The court system will be used in grouping hangars, the buildings opening up on courts where planes are tuned up before being moved out to the landing and take-off area. Hangars will be one hundred by one hundred feet. On the southeast side of the seaplane channel additional hangars will be located.

A wireless station will be erected on the west bank of the channel. Facilities for lighter-than-air craft are not included in the present plans of the airport, although land for this purpose is available to the north of the field where a mooring mast and airship sheds can be built in the future.

STEEL HANGARS!
for New England



OVAL OR PITCHED ROOF

Priggen Steel Hangars are fireproof, durable, inexpensive. Extra-rigid construction insures perfect protection and lasting service. Two recent jobs are: Wallingford Air Transportation, Inc., Wallingford, Conn. (65′ x 60′ x 12′) and Aero Club, Inc., Beverly, Mass. Individual hangars our specialty.

Write or wire our Hangar Department.

Accessory Buildings for Airports, Filling Stations, etc.,—erected all over New England.

PRIGGEN STEEL BUILDINGS CO.
3 CARLETON ST. CAMBRIDGE (Boston) MASS.

IF IT FLIES—WE HAVE IT

50 complete Libertys, $100 to $200. 35 Hisso A's, $150 to $250. 2 new 9 cylinder Siemens-Halske motors, 125 h.p., $875. 10 new A 7A, 4 cylinder Hall Scott motors, $175. 15 OX5's, $200 to $350. OX6's, $375. Anzani 80 h.p., $400. New 3-cyl. Szekely with Hamilton propeller, $450. One new C-6 and 3 K-6 motors at a bargain. B. M. W., Mercedes, Renault, Hisso H, Le Rhone and all types of motors and parts at reduced prices.

Spark plugs, various makes, 25c. Highest grade $7 helmets, $3.75. $5 helmets, $2. Protector goggles, $5.50. D. H. clincher or straight-side wheels, $8. Small turnbuckles, 15c. Cloth, 30c yard. Dope, $1 a gallon, container and shipping, 50c extra. Everything for the glider; plans, $3 to $15. The "Pelican" glider, complete with steel aerotrus ribs, knocked-down—assemble it yourself for $247.50. 7, 8, 9, 10 and 12 cyl. Scintilla magnetos at half price.

CRAWFORD AIRPLANE SUPPLY CO.
VENICE, CALIFORNIA

Perfected Training

Approved by the Department of Commerce to give perfected and efficient training for private, limited commercial, or transport pilot's license . . . this school is a national leader . . . modern equipment . . . many types of ships to fly . . . and personal instruction from the start . . . write for detailed information.

California Aerial Transport
Municipal Airport Los Angeles, Calif.

Complete Training

GROUND SCHOOL

In classroom and shop, with the guidance of skilled instructors, you you will gain both theoretical and practical experience in every phase of modern commercial aviation. Airtech training is complete training.

FLIGHT TRAINING

Cross country, aerobatics, night flying - - - everyphase of piloting, you learn from Airtech's master pilots. This complete training, in a fleet of modern aircraft, results in the fact that - - - Airtech pilots are good pilots.

Earle Mitchell, veteran airman, Combat Flying Instructor, Issoudon, France, 1917. With thirteen years of flight instruction ---truly a Master Pilot.

AIRTECH FOR AIR TRAINING

AIRTECH

Department of Commerce Approved Ground and Flying School

Lindbergh Field San Diego California

Please send me, without obligation, complete information on the courses checked below:

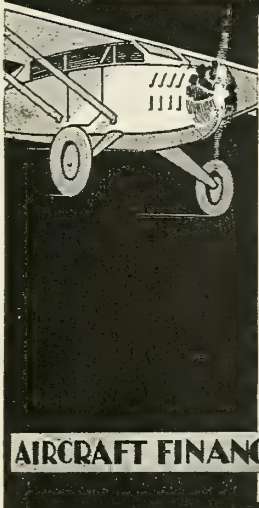
- ☐ PRIVATE PILOT
  10 hours dual—10 hours solo flying.
  30 hours Ground School
- ☐ LIMITED COMMERCIAL PILOT
  25 hours dual—25 hours solo flying.
  60 hours Ground School.
- ☐ TRANSPORT PILOT
  50 hours dual—150 hours solo flying.
  140 hours Ground School.
- ☐ ELEMENTARY MECHANIC
  240 hours Ground School.
- ☐ ADVANCED MECHANIC
  480 hours Ground School.
- ☐ MASTER MECHANIC
  720 hours Ground School.

Name ____________________

Address ____________________

City ____________ State ____________

AIRCRAFT INSURANCE



Life . . Fire . . Theft . . Cargo Property Damage . Windstorm Compensation . . . Accidental Damage . . Personal Accident Ground Property Damage . . . Public and Passenger Liability Airport Liability . . Air-Meet Liability . . . Delivery Flight Blanket Policies . . . .

AIRCRAFT FINANCE

OTHER FORMS SPECIALLY CONSTRUCTED

BEHRENDT-LÉVY INS. AGENCY

Insurance Exchange Bldg. Los Angeles

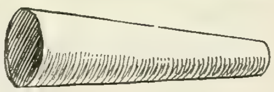
HAL SMITH Dept. Mgr. VAndike 1261

RUSSELL PARACHUTE COMPANY'S

SPECIAL PRICES ON

STANDARD DESIGN

WIND CONES



Large and durable, with reenforced grommets for lacing. Made of specification cotton material.

SIZE:	Natural White	Orange Yellow
8 ft. long by 20 in. dia. at large end	$6.00 Each	$7.50 Each

Size: 12 ft. long by 36 in. dia. at large end

Natural White $8.00 Orange Yellow $10.00

GENUINE RUSSELL PARACHUTE

SILK MUFFLERS FOR COLD WEATHER

A useful addition to any man's wardrobe. Soft, comfortable, dressy and warm. It really keeps out the cold. Generous size, 2¼ yds. long by 30 ins. wide. Made of seamless, first-quality natural white Parachute silk.

$6.00

Same quality and size, with cross seams $3.00

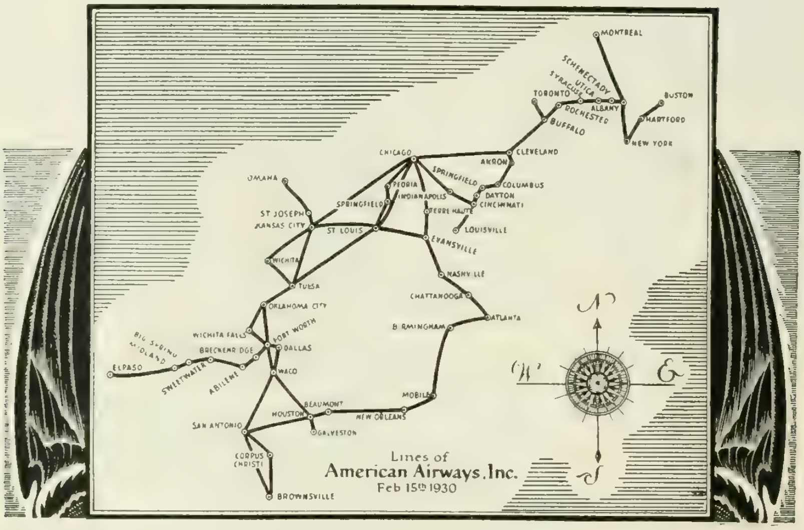
Satisfaction Guaranteed

Write Direct To

RUSSELL PARACHUTE CO.

1202 Kettner Blvd. San Diego, Calif.

Where the World's Largest Air Transportation . . . GETS



Lines of
American Airways, Inc.
Feb 15th 1930

by GLENN OGLE

Employment Manager
of
Universal Aviation
Schools

If you wonder what aviation can offer you, stop and consider the number of pilots, mechanics, welders, executives, salesmen, radio operators, service men, traffic men, accountants, cashiers, clerks, and others needed to operate a large air transportation system. Roughly, you can figure that for every pilot 40 non-flying men are required.

Scope of American Airways, Inc. . . . . .

Notice the map above which shows the territory over which planes are being operated on regular daily schedule by the American Airways, Inc., the world's largest air transportation system and the organization of which Universal Aviation Schools are a division.

New routes are being added from time to time, each one of which demands more men with aviation training. Aviation's problem is to train men fast enough to fill the positions constantly being opened.

How Men Are Selected . . .

As employment manager of Universal Aviation Schools, I am constantly being called upon for men of all qualifications. With my file of applications before me, I select the type of man who seems best fitted to fill the requirements of the position open. A man's past experience is very important. Aviation training is absolutely essential and the source of that training must be reliable.

Universal Aviation

UNIVERSAL AVIATION SCHOOLS
"THE SKYWAYS OUR HIGHWAYS"

A DIVISION OF AMERICAN

Operating Company of The Aviation

A NATIONAL SYSTEM OF U. S. GOVERNMENT

System of ITS MEN . . . . .

It is on this basis I am placing many men in aviation.

Why Universal Trained Students Get Preference . . .

This service is not limited to graduates of Universal Aviation Schools, but Universal graduates receive first consideration, and other things being equal, are given first opportunity.

An important reason for this is that we have accurate check on their qualifications, including not only their references, previous employment, education, etc., but also first-hand knowledge of their grades, industry, dependability, personality, and character. From experience, other large aviation companies have learned to place confidence in Universal trained men.

Facts About Universal Aviation Schools

Universal Aviation Schools are located in a number of principal cities in the United States. Each school has been inspected, rated and approved by the United States Department of Commerce. This is the highest recommendation any aviation school can have.

Training is necessarily thorough. Equipment is complete, in keeping with the magnitude of the whole organization. Instructors are seasoned veterans who have passed all Department of Commerce examinations. The Universal graduate invariably makes good—he must be good to graduate.

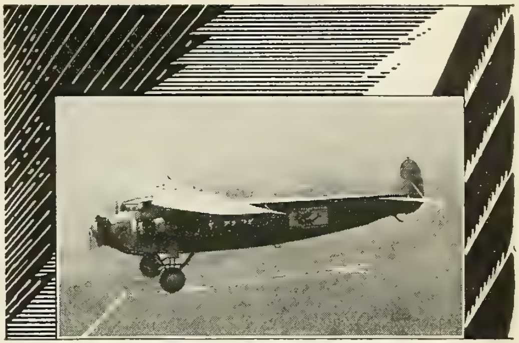
What Position Do You Want? . . .

We are training a special group of young men this summer for positions with American Airways, Inc. If you are interested in establishing yourself in this new industry, with us or with others, give us the information asked for in the coupon at the right.

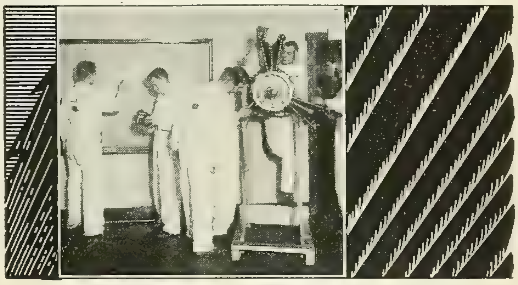
I will personally look over your past experience and advise you without obligation just what training you should have and whether your qualifications meet our requirements.

Glenn Ogle
Employment Manager

Schools
AIRWAYS, Inc.
Corporation
APPROVED SCHOOLS



Student transport pilots are given a minimum of 10 hours training on tri-motored planes.



Shop instruction includes actual work on latest type airplane motors and aircraft.

Class-room lectures cover every phase of aviation theory.

INFORMATION BLANK
FILL IN AND MAIL

Mr. Glenn Ogle, Employment Manager,
UNIVERSAL AVIATION SCHOOLS,
1048-57 Boatmen's Bank Bldg.,
St. Louis, Mo.

Please advise me what training I should take.

I prefer position as Pilot......................,
Mechanic......, Welder....., Office work.....
(check which)

Name.............................*Age*.......
Address......................................
City......................*State*.............
Telephone Number............................
My past experience is.........................
....
....
....

03

AERONAUTICAL INDUSTRY

AVIATION INSURANCE AGENCY PROPOSED BY GUGGENHEIM FUND

RECOMMENDATION of the establishment of a statistical, rating and legal agency which would be centrally located to maintain aviation mortality experience tables, is published in "Aviation Life Insurance," a report recently published by the Daniel Guggenheim Fund for the Promotion of Aeronautics. This agency would select, classify and adjust all aviation risks. The survey which resulted in the report is the result of six months' work completed by Capt. Ray A. Dun of the United States Army Air Corps. The report includes thirty-one charts giving hitherto unavailable official flying and fatality statistics, which indicate an increase in the degree of safety in flying during recent years.

The report considers life insurance as the most important insurance problem to be settled in the aeronautical industry, blaming the prohibitive cost of obtaining such insurance on the practice of those engaged in the industry of leading the general public to believe that flying is extra hazardous. Because of this many people do not fly, and the aviation industry suffers in patronage and in insurance rates as a consequence, according to the report.

The insurance industry does not have a true conception of the hazards of aviation or the relative degrees of risk, and companies are attempting to write aviation insurance without the technical and practical advice of people trained in the aviation industry. The survey shows that there are in the United States and Canada 109 companies writing aviation insurance policies; eighty-four of these companies will accept passengers and, of this number, twenty-four companies will accept passengers only. No company will write policies exclusively on pilots.

As the result of a study of the ratings employed for aviation risks, the survey found that there is no uniformity in either the system of rating or the rates proper, the relative degree of hazard not having been properly determined in many cases before ratings were made.

Sufficient statistics are now available to permit the insurance industry to classify properly the aviation hazard, according to the report, and these statistics, while not available for use for acturial purposes, can be converted readily to meet the needs of the actuary. The report recommends the classification of aviation risks and the proposing of uniform ratings.

PROHIBITS TOWING OF GLIDERS BY PLANES

GLIDERS shall not be towed by other aircraft except by special permission of the Secretary of Commerce, according to an amendment of the Air Traffic Rules, recently announced by Maj. Clarence M. Young, Secretary of Commerce for Aeronautics. The amendment prohibits the towing of any type aircraft by other aircraft and is aimed specifically at the practice of towing gliders by airplanes, either for the purpose of launching them into the air, after which they are released, or for towing them through the air by means of a tow line.

Parachutes or other contrivances designed primarily as safety equipment are exempted from the regulation. Permission for gliders to be towed by aircraft will be given by the Secretary of Commerce when it is shown by demonstration that the glider is structurally sound for such work, that the glider pilot is an experienced flier and that the pilot and plane to do the towing are competent and airworthy. Such towing flights will not be permitted unless the Secretary of Commerce is satisfied that the flight will contribute to the advancement of aviation.

PLANES AND AIRPORTS IN UNITED STATES

THERE were 9,740 licensed and identified airplanes in the United States on January 15, according to statistics compiled by the Washington, D. C., bureau of the Aeronautical Chamber of Commerce and made public recently by Frederick B. Rentschler, president of the organization. Of this number, 6,645 were licensed planes in commercial operation and 3,095 were identified planes in private use.

The report lists 4,349 landplanes of the biplane type in use, 1,816 land monoplanes, and 465 amphibions and seaplanes. No ships in the Government service were listed, only planes classified as commercial aircraft being included in the report. There are 1,463 recognized airports throughout the country, and the number of aircraft dealers totals 791.

California is first in the number of licensed and identified aircraft with a total of 1,237 planes in that state. New York is the only other state with more than 1,000 airplanes, having 1,160; New York has 955 licensed aircraft and California has 875.

California has more airports than any other state, having 154; Texas is next with 101; and Pennsylvania third with 85. The number of airports in other states in the ten highest are as follows: Ohio, 76; Illinois, 67; New York, 56; Oklahoma, 50; Wisconsin, 45; Michigan, 45; and Iowa, 45.

COMMITTEE FORMED ON AERONAUTIC RADIO

UNDER the chairmanship of Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, an Executive Committee on Aeronautic Radio has been organized in the Aeronautics Branch, it was announced Mrch 30. The function of the Executive Committee on Aeronautic Radio is to determine the policies of the Aeronautics Branch in matters pertaining to radio aids to air navigation and to the requirements of the Air Commerce Regulations relative to radio equipment for aircraft and ground stations.

The committee, in addition to Mr. Young, is composed of the following officials of the Aeronautics Branch: F. C. Hingsburg, Chief Engineer, Airways Division; Dr. J. H. Dellinger, Chief of the Radio Research Section; Harry H. Blee, Director of Aeronautic Development; and Gilbert G. Budwig, Director of Air Regulation. Frederick R. Neely, Chief of the Aeronautic Information Division, is secretary of the committee.

This committee will augment the work of the executive board of the Aeronautics Branch which was created by Mr. Young shortly after his appointment as Assistant Secretary of Commerce for Aeronautics, and which is composed of the Director of Aeronautic Development, Mr. Blee; the Director of Air Regulation, Mr. Budwig; and the Chief Engineer of the Airways Division, Mr. Hingsburg. This board coördinates the work of the entire Aeronautics Branch and determines policies affecting all of its activities.

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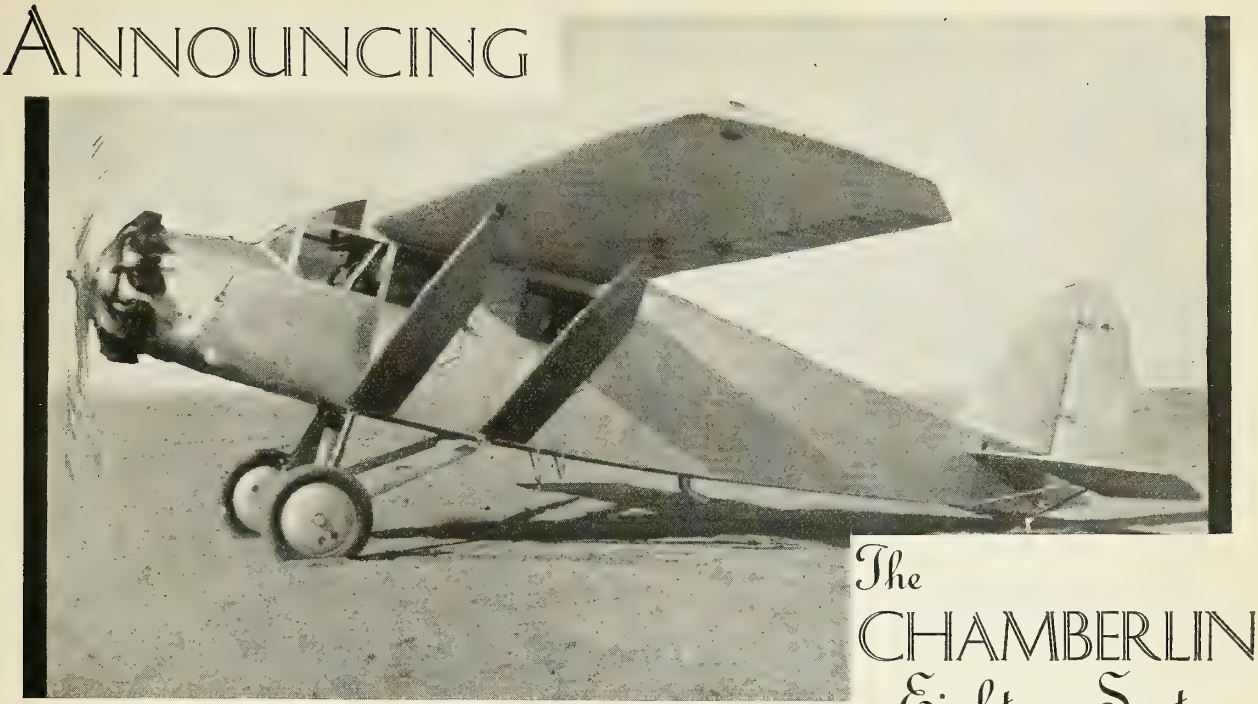


The CHAMBERLIN Eight - Seater

DESIGNED BY COLONEL CLARENCE D. CHAMBERLIN

THE Chamberlin eight-place cabin monoplane is new. It's revolutionary. Startling. With a Wright Whirlwind J-6 or Wasp Jr., it carries seven passengers and a pilot with greater safety than a multimotored plane. It's a ship that will make passenger transportation pay decent dividends. It was designed from the pilot and operator's viewpoint. It is engineered by the best men in the business. And it's built by an organization whose aircraft experience is unsurpassed anywhere.

It is not possible in an advertisement to describe the all-clear visibility, bird-like stability, comfort, maneuverability, easy handling and highly practical control features which this new plane possesses. There is no plane flying today with which to compare it. But see it yourself! Fly it yourself! We'll be at the Detroit Show and will be pleased to let you put it through its paces.

Clarence D. Chamberlin
PRESIDENT

Exceptional Dealer and Distributor Franchises open. Factory and Sales assistance not available in any other plane.

SPECIFICATIONS:

Length	28 ft. 6 inches
Span	48 ft. 0 inches
Weight	4,440 lbs.
Pay Load	1,260 lbs.
Gasoline Capacity	90 gallons
Cruising Speed	110 M. P. H.
Landing Speed	45 M. P. H.

Equipment includes toilet and luggage compartment, brakes, lights, tail wheel or tail skid, metal propeller, starter, instruments and other standard equipment.

Priced Below the Eight-Seater Class

CRESCENT
AIRCRAFT CORP.
JERSEY CITY, NEW JERSEY

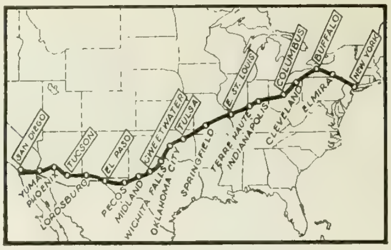
HAWKS' CROSS-COUNTRY GLIDER FLIGHT

CAPTAIN FRANK M. HAWKS will leave San Diego for New York on Sunday, March 30th, in a glider towed by an airplane on the first transcontinental and the longest glider flight ever attempted. At New York, where he is due April 6th, he will land in Van Cortlandt Park.

In the Texas Company's cabin glider, *Eaglet*, Hawks will traverse a 2,800-mile coast-to-coast route in eight days, passing through twelve states and over sixty cities. The Texas Company is sponsoring and financing the flight as a contribution to the growing popularity of gliding which it views as an important medium for stimulating interest in aviation generally.

Taking off from Lindbergh Field, San Diego, 500-feet behind the *Texaco No. 7*, a Waco biplane piloted by J. D. "Duke" Jernigin, Jr., Hawks will proceed 150 miles across the mountains to Yuma, Ariz., the first stop to gas the Waco. After circling Yuma at 1,500 feet, Hawks will release the *Eaglet* from the tow line and glide to earth. When the tow plane is gassed, the "air train" will proceed to Phoenix, where the Waco's gas supply will be again replenished. Thence the route will lead to Tucson, 420 miles from San Diego, completing the longest of the eight daily flights.

Thus, at a cruising speed of about seventy miles an hour, the "air train" will fly toward New York. At New York, Hawks plans to circle Manhattan Island, Brooklyn, Jersey City and other nearby points once or twice before ascending to 5,000 feet to glide into Van Cortlandt Park. The *Eaglet's* gliding ratio of 22 to 1 will enable him to cast off the tow line above Central Park, glide to Van Cortlandt Park, ten miles to the north, and give a demonstration of soaring before he lands.



Capt. Hawks' transcontinental route, with overnight stops shown boxed above the line and refueling stops below

In flight, Hawks will communicate with Jernigin over a telephone installed by the Western Electric Co., using a telephone line supported by the tow cable. Plugs at the ends of the telephone line and jacks in the tail of the plane and in the nose of the *Eaglet* will permit release of the telephone line by either craft along with the tow cable. Dry cells carried in the plane supply the current.

Connected to Hawks' phone will be a specially-built three-tube radio receiving set which, with its small batteries, will be carried in the *Eaglet*. Another feature of the flight will be the first glider mail, ten pounds of it, which Hawks will transport in the *Eaglet* for the benefit of stamp collectors.

The *Eaglet* is the first cabin glider ever constructed. It was designed and built for the Texas Company by Prof. R. E. Franklin, of the University of Michigan, and his brother, Wallace, who will be the "air train's" lone passenger, flying in the Waco. Of monoplane type, with a fifty-foot wingspread and twenty-one-foot length, the *Eaglet* weighs 300 pounds empty. Loaded with Hawks, his equipment and cargo it will weigh 500 pounds.

The *Eaglet*, enclosed cockpit Franklin glider, which Capt. Hawks will use on his coast-to-coast 2,800-mile flight. The *Eaglet* has a wing span of fifty feet.

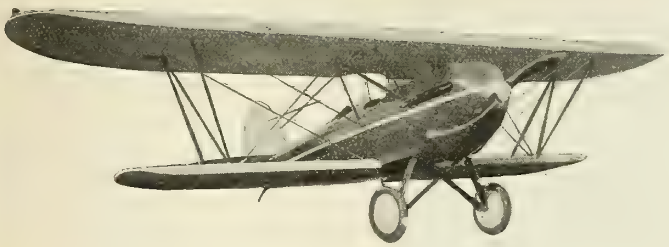
Although Captain Hawks' fame rests largely on aerial distinctions achieved at speeds ranging from 150 to 200 miles an hour, he declares he gets as big a "kick" out of taking off, soaring and landing in a glider at ten to fifteen miles an hour. "There's just as much skill and just as much thrill and fun in gliding," he says, "as in speeding through the air at double express-train paces. In addition to the sport, gliding has a valuable role to play in aviation's development. It not only is highly useful in teaching the untrained all the rudiments and many of the niceties of handling aircraft, but from it aeronautic engineers may learn much to aid them in refining the airplane."

Hawks' schedule, and the twenty-one airports he will visit are listed below.

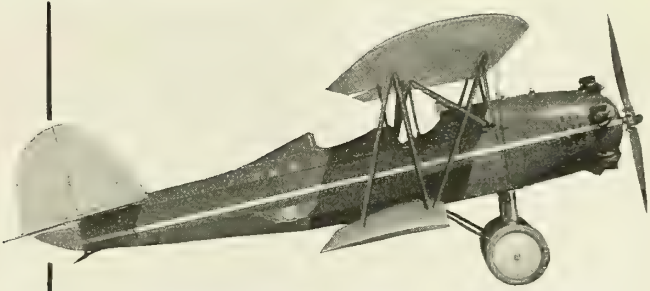
City	*Flying Field*
1st day (March 30)	
San Diego	Lindbergh Field
Yuma	Fly Field
Phoenix	Phoenix Airport
Tucson	Mayse Field
2nd day (March 31)	
Lordsburg	Municipal Airport
El Paso	El Paso Airport
3rd day (April 1)	
Pecos	Municipal Airport
Midland	Midland Airport
Sweetwater	Municipal Airport
4th day (April 2)	
Wichita Falls	Staley Airport
Oklahoma City	Municipal Aviation Park
Tulsa	Garland Airport
5th day (April 3)	
Springfield	McClure Field
East St. Louis	Parks Airport
6th day (April 4)	
Terre Haute	Dreser Field
Indianapolis	Stout Field
Columbus	Port Columbus
7th day (April 5)	
Cleveland	Cleveland Airport
Buffalo	Buffalo Airport
8th day (April 6)	
Elmira	Elmira Airport
New York	Van Cortlandt Park

DISTRIBUTORSHIP in Illinois for the Evans Glider Company of Los Angeles, Calif., has been contracted by the Midwest Airways Corporation of Aurora, Ill. The company recently sold four gliders which were ordered by the following organizations: Aurora Glider Club, Monmouth Glider Club, L. and L. Aerial Service of Springfield, Ill., and the Chicago Aero Sales of La Grange, Ill.

ATTENTION!



3-Place OX-5 "BIRD" Complete, $2195



3-Place KINNER "BIRD" Complete, $4095

DEALERS:

We have a very attractive and profitable sales proposition to offer. Write for full details, factory cooperation, etc.

"BIRD" PRICES REDUCED

NAME the ship with the same horsepower, that can compare with the "Bird" in performance, stability, construction and appearance.

"ASK THE PILOT WHO FLIES ONE"

BIRD

BRUNNER-WINKLE AIRCRAFT CORPORATION

1-17 Haverkamp Street,
Glendale, Long Island,
New York.

ELINOR SMITH'S NEW ALTITUDE RECORD

A NEW woman's world altitude record of 27,418 feet was established by Elinor Smith in a flight at Roosevelt Field, L. I., on March 10, using a standard Bellanca Pacemaker. The former altitude record for women of 23,996 feet was established by Marvel Crosson in a flight at Los Angeles, Calif., in 1929.

Miss Smith took off at 10:36 a.m. and landed after a flight of about one hour. The plane carried sixty-three gallons of fuel and two oxygen tanks. The flight was officially observed for the National Aeronautic Association by Carl Schneider, who sealed the barograph and forwarded it to Washington, D. C., for official calibration.

The Bellanca Pacemaker which Miss Smith used is a six-place cabin monoplane powered with a Wright Whirlwind 300 engine. The engine was equipped with a supercharger on the flight. Richfield gasoline and Richlube motor oil and rocket-arm grease were used on the flight.

ENGINE TEST PLANT FOR COMMERCE DEPT.

CONSTRUCTION of an aircraft engine testing laboratory at Arlington, Va., has been completed by the Aeronautics Branch of the Department of Commerce for use in testing aircraft power plants for Approved Type Certificates. The laboratory is equipped with three test stands and will have a capacity of approximately fifty-two engine tests a year.

The new engine-testing laboratory of the Aeronautics Branch was designed for efficiency and speed in mounting, testing and inspecting aircraft engines. The three test stands are under one roof and are located in a one-story fire-proof building. A room equipped with instruments used in testing the engines has been constructed adjacent to each stand for the observers. From each of these rooms the engineers in charge of the tests will observe the conditions of the engines during the tests as to temperature, revolutions per minute, pounds of fuel consumed and other data included in the report of the department for engine Approved Type Certificates.

Zimmerley's Altitude Flight Is Official World Light Plane Record

THE altitude record of 24,070 feet for light airplanes established by Barney Zimmerley in a Barling NB-3 monoplane on February 16, during a flight at Forest Park, St. Louis, Mo., has been recognized by the National Aeronautic Association as an official world's record. The association has forwarded the report on Zimmerley's flight to officials of the Federation Aeronautique Internationale for homolgation.

The plane which Zimmerley used on the flight was powered with a Model R 266 five-cylinder aircraft engine made by the Lambert Aircraft Engine Corporation of Moline, Ill. The former record of 22,250 feet was established by Paul W. Baumer on July 8, 1927, in a flight at Hamburg, Germany.

Elinor Smith and George Haldeman before the latter's record altitude flight

COSTS AT APPROVED FLYING SCHOOLS

A SURVEY of all flying schools which have been approved by Federal authorities has been completed by the Aeronautics Branch of the Department of Commerce, according to a recent announcement of the department. The survey was made for the purpose of supplying information in response to an increasing number of inquiries which have been made concerning flight training.

The average cost of instruction for the private pilot's license course is approximately $565, and the average length of time to complete the course is about eight and one-half weeks, according to the results of the survey. The average minimum time required to complete the course is five and one-half weeks, and the average maximum time is two and three-fifths months.

The average cost of a limited commercial course is $1,255; the average minimum time being two and four-fifths months, the average maximum, four and three-fifths months. For the transport pilot's course, the average cost is $4,304; the average minimum time is seven months and the average maximum time is eleven and three fifths months. These tuition charges do not include room and board, the average cost of which was found to be approximately $12 per week.

Part time instruction is discouraged in the schools which were included in the survey, and none of the schools replying to the questionnaire agreed to furnish employment for their graduates.

CLIFFORD W. HENDERSON, will be manager of the 1930 National Air Races to be held in Chicago this summer, according to information recently made public by the directors of the event. Mr. Henderson will be aided in the direction of the program by Shorty Schroeder.

HALDEMAN SETS NEW ALTITUDE RECORD

A NEW world's altitude record of 30,453 feet for commercial airplanes was established by Capt. George W. Haldeman, chief pilot of the Bellanca Aircraft Corporation, in a flight on February 28 at Bellanca Field, Newcastle, Delaware. He used a standard Bellanca Pacemaker powered with a Wright Whirlwind 300 nine-cylinder radial engine.

Capt. Haldeman was in the air for one hour and sixteen minutes on the flight and encountered temperatures of more than thirty degrees below zero. He carried a supply of oxygen which he began to use at an altitude of 17,000 feet. Shirley J. Short was the official observer for the National Aeronautic Association and forwarded the sealed baragraph to Washington for calibration by the Bureau of Standards.

AMERICAN CIRRUS LIGHT PLANE TOUR

AN airplane derby for light airplanes powered with American Cirrus engines will be sponsored by American Cirrus Engines, Inc., according to a recent announcement of officials of the Marysville, Mich., firm. Prizes totaling $25,000 will be posted for the race which will be flown over a 7,500-mile course to Mexico, Canada and over the United States. The derby will start from New York on July 21.

The race will be a free-for-all airplane speed contest, and pilots of either sex or any nationality licensed by a recognized government may compete. Contestants may land wherever they desire and remain on the ground as long as they wish. Flying time will be computed as the time between the departure from and arrival at control stations.

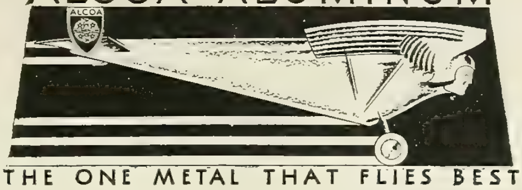
The course of the race has been established as follows: New York, Atlanta, Houston, Mexico City, Dallas, El Paso, Los Angeles Salt Lake City, Cheyenne, Omaha, Chicago, Montreal, and New York City.

Greenland Meteorological Expedition

FINAL preparations have been completed for the Second Roumanian Arctic Expedition which has been organized for the purpose of establishing a meteorological station on the east coast of Greenland. The work of the expedition will be the first step in the opening up of an air route between Europe and the United States, according to a recent announcement of Dr. Constantin Dumbrava, commander of the expedition.

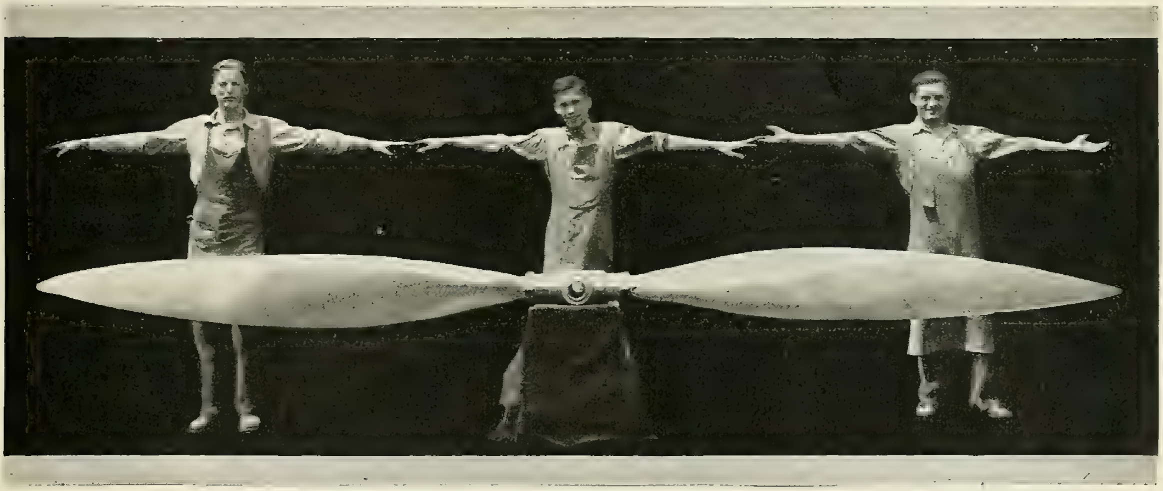
Arrangements have been completed by Dr. Dumbrava for an airplane to fly from Europe to the United States, via Greenland, this summer, and for a plane to fly from the United States to Europe, via Greenland, both planes taking off as near the same time as possible. These planes will be able to stop at the meteorological base when half way across the route, according to present plans, the pilots obtaining food and rest, the planes being refueled and minor repairs made before taking off for the remainder of the flights.

ALCOA ALUMINUM



THE ONE METAL THAT FLIES BEST

Alcoa Aluminum Propellers are light as wood, 10 times as strong



The fatigue limit of modern propellers forged of Alcoa Aluminum has never been reached in service. No case is known of one wearing out. The world's record endurance flight was made with an Alcoa Aluminum propeller.

These propellers have the strength of mild steel —55,000 pounds per square inch minimum, but only ⅓ the weight. Compared to wood, while they weigh about the same, they have, roughly, ten times the strength; and of course cannot splinter or warp.

In balance, Alcoa Aluminum propellers have a decided advantage over wood. No two pieces of wood have exactly the same weight distribution. With Alcoa Aluminum, blades can be made that are identical in all respects.

Propellers, indeed all forgings of Alcoa Aluminum, are highly resistant to corrosion. They combine maximum strength with maximum lightness. They are easy to machine and easily take a high polish.

More than 60 parts of airplanes are now being made of Alcoa Aluminum forgings.

A representative from our nearest office will gladly give you details on the use of Alcoa Aluminum for aircraft, together with full technical metallurgical data. ALUMINUM COMPANY *of* AMERICA; 2484 Oliver Building, PITTSBURGH, PA. Offices in 19 Principal American Cities.

ALCOA ALUMINUM

ALCOA

CHINA as an AERONAUTIC MARKET

By Wing Over

CHINA, with an area almost one and one-half times as large as the United States, and with few railroads and highways, is becoming air-minded. The country is encompassed by far-flung boundaries that make facile transportation a necessity vital to the unification and development of the nation. It is criss-crossed by mountains and lowlands which would make the establishment of an adequate system of railways difficult and costly, and which suggest airlines as the logical form of transportation.

Public interest in China has been stimulated by the long-distance flights successfully carried out by Americans and Europeans. No longer is flying regarded with awe by the average Chinese, educated or uneducated, and more and more young Chinese men and women are learning to fly. The flying school operated by the Canton Aviation Bureau at Canton, trained approximately one hundred flying students and fifty mechancs during 1929. Chinese fliers are taking a prominent part in the wars which are chronic in China but which have helped to make the nation air-minded. At first Russian fliers were employed both as instructors and pilots in the military air service; now, however, the National government employs only Chinese aviators for military purposes.

Several air mail services have already been started in China and numerous other schemes for short and long distance airlines are under consideration by the Chinese government and by private individuals. Included in the developments of the aviation industry in China during 1929 was the formation of the China National Aviation Corporation, which was granted full control of civil aviation under the sanction of the State Council. The company was given the sole right to enter into contracts with private companies establishing air transport services and was granted full control over air mail, passenger and express air transport services throughout the country. During 1929 the China National Aviation Corporation entered into contracts with American, German, British and French air transport companies with which plans were formed for the establishment of a network of airways.

The association divided the country into five sections for purposes of developing commercial aeronautics. These areas are Kiangsu, Chekiang, Anhwei, Kiangsi, and Fukien. It is planned to make the three eastern provinces a sixth section. There is an executive committee of fifteen members with General Li Chi-sen as chairman of the committee and president of the association. Leading military and civil officials are the other members.

An experimental air mail and passenger service between Shanghai and Nanking were started on July 9, although the lack of intermediate landing fields prevented the maintenance of a regular schedule of operation. When the Shanghai-Nanking-Kiukiang-Hankow passenger, mail and express air transport service was established by the China National corporation on October 21, the concession to carry air mail was granted to that line, the Shanghai-Nanking line continuing to operate temporarily as a passenger service. The Shanghai to Hankow airline operates five American-made Loening amphibions powered with Pratt and Whitney Hornet engines, the scheduled route following the course of the Yangtse River. Each plane accommodates six passengers and baggage. One trip daily each way is made, the total flying time, exclusive of scheduled stops, being six hours and twenty-five minutes. American pilots are used on the planes. Short wave radio stations are maintained at the airports on the route and receiving sets have been installed in the planes operated on the service.

China Airways will establish in 1930 an air mail service between Nanking and Peiping and Shanghai to Canton, according to present plans. A survey of the Nanking-Peiping route has been started and the operation of planes over the route is scheduled to start the middle of April. With the opening of these two scheduled routes China Airways will have in operation an air mail service covering a total of 3,970 miles daily with one plane each way on each leg of the route as follows: Shanghai-Hankow, 1,032 miles; Shanghai-Peiping, 1,484 miles; and Shanghai-Canton, 1,454 miles. Considerable progress has also been made in the development of aviation in North China.

The manufacture of airplanes has already made considerable progress in China, and there is a factory in Shanghai, one in Canton, and another in Fukein. The engines are imported, the parts, wings, and fuselages being made with Chinese materials. There is no doubt, however, that China will continue for many years to be a good market for foreign-made airplanes and parts, which are more reliable than those made locally.

Imports into China of aeronautic products during the past four years have grown by leaps. In the use of China's development as a market for exports of airplanes, engines and parts, the United States has grown to be a dominant factor. In 1926 China imported aviation equipment with a total value of $20,752, of which the U. S. supplied but $131. Exports worth $289,656 went into the country in 1927, the U. S. share amounting to $47,857. In 1928 the Chinese approval of American products became evident when $227,963 of the $364,500 total aviation imports were from United States factories. During 1929 the United States alone exported $813,929 in airplanes, engines and parts, directly and through Hong Kong, to China.

China purchased in 1929 a total of 104 airplanes abroad. Airplanes imported into the country during this period were from the following sources: thirty-five from the United States, twenty-nine from Great Britain, twenty-three from Germany and seventeen from France.

These figures, combined with the fact that China began her first active organization and operation of aerial services during 1929, indicate two facts significant to American manufacturers of aeronautical equipment: (1) With extensive development plans outlined for 1930, China has only started buying the world aeronautical market. (2) In this trade the Chinese approbation of American products has given the United States an advantage over other producing countries, which, with the systematic organization of sales and service facilities, can be increased to make China the major market for American aircraft.

It is very important that careful attention be given to the packing of machines and parts when shipping to China. Crates should be made of matched lumber, without large knots, and there should be an ample quantity of waterproof paper. Propellers and other spare parts should be bolted to the top and sides of the case, and metal parts should be covered with heavy cup grease. A good supply of bolts, screws, pins, wire, as well as detailed instructions for assembling and care of machines should accompany all shipments.

Shanghai, Tientsin, and Dairen are the principal ports to which airplanes and parts are shipped, and it is there that firms interested in this market should maintain agencies or, still better, branches of their own. The Chinese are not difficult to deal with and are most anxious to progress.

HISTORY OF UNITED STATES AERONAUTICAL EXPORTS

	Exports of Aircraft		Exports of Engines & Parts	
Fiscal Year	*Number*	*Dollars*		*Total*
1912	29	$105,805	......	$105,805
1913	29	81,750	$25,802	107,552
1914	34	188,924	37,225	226,149
1915	152	958,019	583,427	1,541,446
1916	269	2,158.395	4,843,610	7,002,005
1917	135	1,001,542	3,133,903	4,135,445
1918	20	206,120	8,877,977	9,084,097
July-Dec., 1918	41	562,600	9,139,781	9,702,381
Calendar Year				
1919	44	215,300	3,249,226	3,464,526
1920	65	598,274	554,375	1,152,649
1921	48	314,940	157,608	472,548
1922	37	156,630	338,300	494,930
1923	48	309,051	124,507	433,558
1924	59	412,738	385,535	798,273
1925	80	511,282	272,377	783,659
1926	50	303,149	724,061	1,027,210
1927	63	848,568	1,055,015	1,903,583
1928	162	1,759,653	1,905,070	3,664,723
1929	354	5,574,480	3,628,905	9,202,385

JAN. 1930 AERO EXPORTS

AERONAUTICAL exports amounting to $573,255 were shipped from the United States during January, 1930. These exports included seventeen airplanes worth $274,189; twenty-five airplane engines with the total selling price $100,748 and parts amounting to $198,318.

During the first month of 1930, China, Chile and Argentina were the leading markets of American-made aeronautical products. China imported three aircraft, six engines and parts, making a total of $145,955. Chile bought two planes worth $71,200 and parts totaling $43,080. Argentina imported four airplanes from this country amounting to $46,079 and parts worth $9,044. Peru received a total of $35,121 during the month.

Haskelite used exclusively in the Travel Air six-place cabin transport

PLYWOOD
HASKELITE
PLYMETL

Weatherability

Planes flying on schedule must stand up day after day—under all conditions of moisture and temperature.

It is a tribute, therefore, to Haskelite's weatherability that it is used in a majority of the country's transport and mail planes. No other plywood has equalled the water-resistance of this blood albumin plywood. Write for engineering data.

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MANUFACTURING CORPORATION
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Curtiss Flying Service

California Panel & Veneer Co.
Los Angeles, Calif.

Air Associates, Inc.
Garden City, L. I.

In Canada: Railway & Power
Engineering Corporation, Ltd.

See the Haskelite exhibit at the Detroit Show—73 and 75 Lindbergh Airway

AD4-Gray

THOMPSON TROPHY RACE ESTABLISHED

AN international airplane speed race to be known as the Thompson Trophy Race has been established for the purpose of de- nautic Association and a permanent trophy to be competed for annually has been established by Charles Edwin Thompson, president of Thompson Products, Inc., of Cleveland, Ohio. The Thompson Trophy Race has been established for the purpose of developing faster landplanes. The air ministries of France, England, Germany, Italy, Japan, Spain and the United States have been invited to enter airplanes in the contests which will be held for the trophy. The Thompson trophy race will be held for the first time at the National Air Races at Chicago this summer.

The trophy will be competed for annually, passing for a ten-month period into the possession of the nation represented by the plane and pilot winning each annual event. Replicas of the trophy will be awarded to the first three fliers placing in each annual race. In addition to this award prize money will be awarded the fliers.

The types of planes which enter the contests will not be limited as to specifications, and the race will be a free-for-all airplane speed contest for any type landplane powered with any type of engine or engines, superchargers and special fuels being permitted. Five prominent sculptors in the United States will compete in submitting designs for the Thompson Trophy and the winning design will be used.

Stinson Sales Representatives Increasing

SINCE January 1 there has been an increase of forty-six per cent in the number of dealers representing the Stinson Aircraft Corporation of Detroit, Mich., according to a recent announcement of William A. Mara, vice president of the Stinson company. New dealers are affiliating with the company at the average rate of five per week, according to Mr. Mara, and the total number of dealers will be increased approximately one hundred per cent during 1930.

Dealers for the Stinson company have been appointed in several foreign countries since the first of the year. Parts depots will be established in South America, Canada and the Orient by the Stinson firm, to service its planes in these foreign territories.

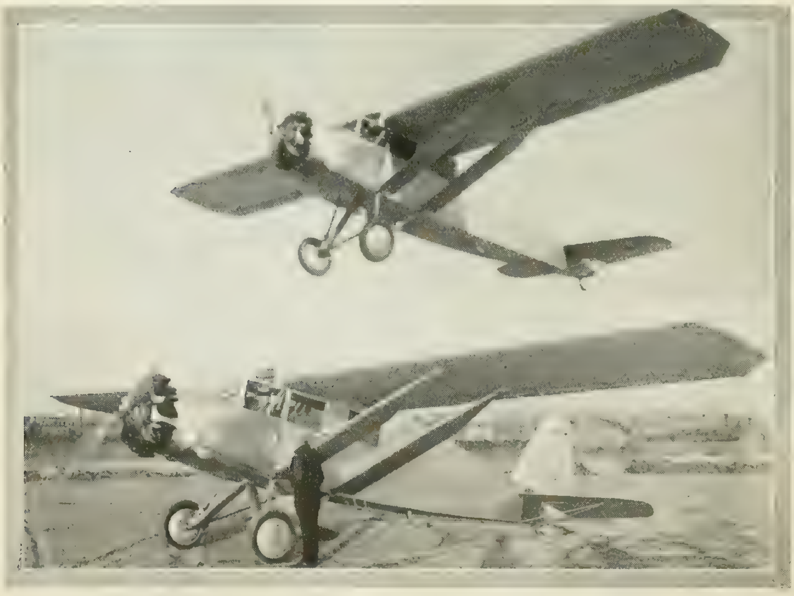
BERLINER-JOYCE AND DOUGLAS TO MERGE

BY action of the board of directors of the Berliner-Joyce Aircraft Corporation of Baltimore, Md., on March 8, negotiations have started for the joining of the Douglas Aircraft Company, Inc., of California and the Berliner-Joyce organization. The proposal of the merger of these two aircraft manufacturing concerns was taken up at a special meeting of stockholders of the Berliner-Joyce Aircraft Corporation on March 21.

The Berliner-Joyce Aircraft Corporation began operations over a year ago. The plant of the concern is located near Dundalk, Baltimore, and occupies five and a half acres of land. About 250 men are employed. The charter existence of the Berliner-Joyce Aircraft Corporation will be continued and present officers will operate it as a unit of the Douglas Aircraft Corporation, Inc., when the change is consummated.

American Propeller Company a Subsidiary of Bendix Aviation Corporation

THE American Propeller Company of Baltimore, Md., was omitted from the list of companies subsidiary to the Bendix Aviation Corporation in the article "The Grouping of Aircraft Companies" which appeared in the March issue of AERO DIGEST. The American Propeller Company has been a member of the Bendix group since September 1, 1929.



The Chamberlin Eight-Seater built by the Crescent Aircraft Corporation

CURTISS-WRIGHT TO AID FLYING CLUBS

A PLAN for the organization of flying clubs has been inaugurated by the Curtiss-Wright Flying Service, Inc., for the purpose of reducing flying and ground instruction for private and limited commercial pilots' licenses. Plans for the organization of clubs, which the company will establish throughout the country, propose the sale of Gipsy Moth planes at cost prices to the clubs. The clubs are required to function and support themselves by giving flying instruction to members, charging a maximum of $5 an hour for solo flying and $13 an hour for dual instruction. Planes sold to the clubs according to this plan will be serviced by the Curtiss-Wright organization at reduced prices.

The number of clubs which will be established throughout the country under the plan adopted will be limited to not more than one at each Department of Commerce approved airport. The organization of flying clubs according to the Curtiss-Wright plan has been started at the Lambert-St. Louis Field, St. Louis, Mo., and the new airport of the Curtiss-Wright service at East St. Louis.

Capt. Archibald Johnston will direct the organization of the Curtiss-Wright Flying Service system of flying clubs at the offices of the Curtiss-Robertson Airplane Manufacturing company at Lambert-St. Louis Field.

Written Examinations for Pilots' Licenses

A LIST of 250 questions indicating the general scope of the written examinations which applicants for pilots' licenses are required to pass, has been prepared by the Aeronautics Branch, Department of Commerce. The questions indicate the broad knowledge of civil aeronautics, including air commerce regulations, air traffic rules, airplane construction, aircraft engines, meteorology and navigation that is required of applicants for pilots' licenses.

Seventy Fairchild KR-34's for Mexico

A CONTRACT has been made by the Fairchild Airplane Manufacturing Corporation with General Azcárate, chief of the Mexican army air service, under which General Azcárate will manufacture seventy Fairchild KR-34 planes in Mexico City under the license of the Fairchild company. The Fairchild corporation will receive $460,250, according to the terms of the contract, a sum equal to the price of the ships. The planes will be used for training purposes in the Mexican Army Air Service.

Yucatan Distributor for New Standard

OLEGARIO MONTES of Merida, Yucatan, Mexico, has been appointed distributor for the New Standard Aircraft Corporation of Paterson, N. J. He recently took delivery on a New Standard five-place plane powered with a Whirlwind 300 and equipped with special instruments. The company will also deliver to Mr. Montes several New Standard Model D-29A training planes which he will distribute in Yucatan.

ASPHALT *for* AIRPORTS

PORT COLUMBUS AIRPORT, *Columbus, Ohio, showing Asphalt landing field and runways.*

The same Field from an elevation of 2000 feet.

TYPICAL INSTALLATIONS

- Amarillo, Texas, Municipal Airport
- Central Airport, Camden, New Jersey
- Detroit, Michigan, Airport
- Fairfax Airport, Kansas City, Kansas
- Mather Field Airport, Sacramento, California (1918)
- Port Columbus Airport, Columbus, Ohio
- Saint Paul, Minnesota, Airport
- United Boeing Airport of Los Angeles and Burbank
- Valley Stream Airport, Long Island, New York

FOR resiliency under impact; for durability, smoothness and freedom from dust; for economy, adaptability to any needed scale of costs, and for ease of maintenance . . . . Airport Engineers specify Asphalt. Today over two-thirds of the airports of America are using Asphalt as the paving, dust-laying and waterproofing medium. *Write for information.*

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Discoveries and Inventions of the Twentieth Century

By Edward Cressy

EDWARD CRESSY'S volume, "Discoveries and Inventions of the Twentieth Century," is a review of mechanical, chemical and technical progress during the first quarter of the Twentieth Century. The text is illustrated with drawings and photographs and the subjects covered include the revival of water power, internal combustion engines, electricity, soil and crops, chemistry, wireless, photography, radium and radio. Aviation is covered technically and historically, the developments in the construction of heavier-than-air-craft and lighter-than-air-craft and the application of aerodynamic principles to construction is described in addition to a discussion of major flights which have been performed during the past twenty-five years.

Opportunities in Aviation

By Walter Hinton

"OPPORTUNITIES IN AVIATION," by Walter Hinton, is intended to give a practical, specific and definite answer to the reader who asks the question, "How can I get into aviation?" The volume gives a resumé of present conditions in the industry and tells what sort of positions are available in all phases of aviation. Qualifications for these positions are enumerated and the method to follow in training for them are explained in detail, from office and factory positions to flying and mechanical work. The book is intended as a survey of the industry and a presentation of facts rather than the author's opinions.

Dept. of Commerce Bulletins on Airports Published

THE Aeronautics Branch of the Department of Commerce recently published two bulletins, "Airport Management," and "Suggested City or County Aeronautics Ordinance and Uniform Field Rules for Air--ports." The bulletins were published to assist those responsible for the management of airports throughout the country, and to bring about the general adoption of a standard code of airport field rules, according to Harry H. Blee, Director of Aeronautics Development.

THE Navy Department has awarded the New Standard Aircraft Corporation of Paterson, N. J., an order for training planes and spare parts involving a purchase price of approximately $50,000, according to a recent announcement of officials of the New Standard company. The planes ordered by the Navy will be designated type NT-1. The NT-1 has the same specifications and the same construction as the commercial D-29A with the exception of upholstery, padding and instruments.

The Navy Department ordered the planes from the New Standard company following flight tests at the Anacostia Naval Air Station. The Materiel Division, Wright Field, Dayton, Ohio, of the Army Air Corps recently started flight tests of the New Standard D-29A.

SCHEDULE OF COMING AERONAUTIC EVENTS

April. Army Air Corps Field Exercises, Mather Field, Sacramento, Calif.

April 5-13. Third All-American Aircraft Show, Detroit Board of Commerce, Detroit, Mich.

April 8-10. Aviation Meeting of the Society of Automotive Engineers, Detroit, Mich.

April 18-26. Tri-State Aircraft Show, Convention Hall, Camden, N. J. Class C Show, Aeronautical Chamber of Commerce. (Postponed from March 22-29.)

April 25-26. New York Glider Carnival, Old Belleclair Country Club, Bayside, Long Island, N. Y. (Date changed from April 26-27.)

May 3-10. New York Aircraft Show, Aeronautical Chamber of Commerce, Madison Square Garden, New York City, N. Y.

May 14-16. National Airport Conference, Airport Section, Aeronautical Chamber of Commerce, Statler Hotel, Buffalo, N. Y.

May 18-June 1. Italian Air Exhibition, Bologna, Italy.

May 19-22. Fourth National Aeronautical Meeting of American Society of Mechanical Engineers, Dayton, Ohio.

May 28-June 1. New England Air Tour, Dedication of Bowles Airport and Air Races sponsored by the Springfield Chapter of N. A. A., Springfield, Mass.

May 29-30. Gardner Cup Races for Balloons, St. Louis, Mo.

May 30-June 8. Pennsylvania State Air Tour, sponsored by Aero Club of Pennsylvania and Pittsburgh Aero Club.

June 10-15. Celebration of 25th Anniversary of the F. A. I., Paris, France.

June 28-July 6. Pacific Coast Aeronautical Exhibition, sponsored by the Capt. Bill Erwin Post, American Legion, and the Aeronautical Chamber of Commerce, Oakland, Calif.

June 28. Annual British Royal Air Force Display, Hendon, England.

July 3-5. Western States Aeronautical Conference, Medford, Oregon.

July 6. Beginning of International Transportation Exposition, Poland.

July 20. Start of "Challenge de Tourisme Internationale" from Berlin-Tempelhof Airport, Berlin, Germany.

August 30-September 1. James Gordon Bennett Balloon Race, Cleveland, Ohio.

September 1-6. Fifth International Air Congress, The Hague, Holland.

November 27-December 14. Aeronautical Salon, Paris, France.

NEW YORK

ORGANIZATION of General Motive Control, Inc., a holding company affiliated with companies manufacturing and distributing electrical devices, was recently announced by officials of the Consolidated Instrument Company of America, Inc., of New York. General Motive Control has acquired the capital outstanding stock of the American Viscosimeter Company, Inc., manufacturers of viscosity meters designed to record continuously the condition of lubricating oil in engines and machinery.

F. L. HABBEL, vice president of the Bavarian Airplane Corporation of Augsburg in Bavaria, Germany, arrived in the United States on the liner *Bremen* on the 11th of March to attend the All-American Aircraft Show at Detroit, Mich. The Bavarian Airplane Corporation is the manufacturer of the Messerschmitt all-metal planes.

AN order for additional aircraft beacon receivers has been placed with the Radio Marine Corporation of America of New York City by the T.A.T.-Maddux Lines, according to a recent announcement of W. G. Logue, commercial manager of the Radio Marine company. The receivers will be installed on passenger planes flying over the western division route of T.A.T.—Maddux. Including this order, twenty-five aircraft beacon receivers have been ordered from the Radio company by T.A.T. during the past year.

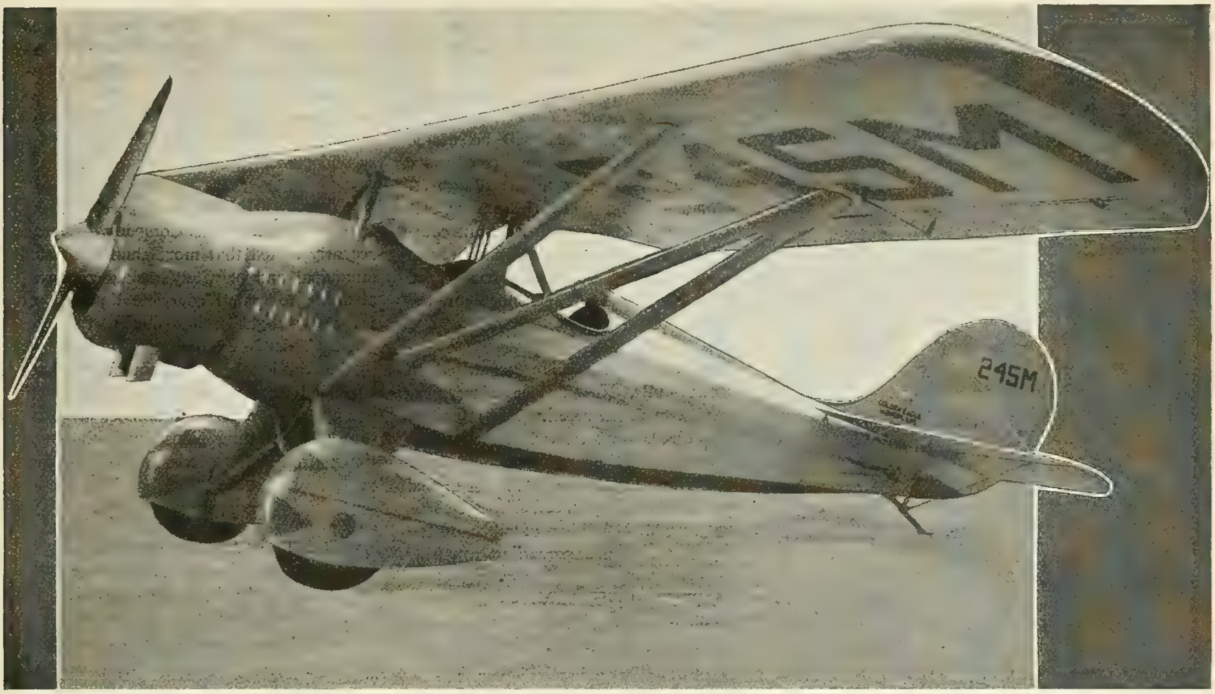
A REDUCTION of the price of Bird planes produced by the Brunner Winkle Aircraft Corporation of Brooklyn, N. Y., has been made in a sales campaign of the company, according to a recent announcement of officials of the Brunner Winkle corporation. The company plans to sell approximately 300 planes during 1930. The Bird plane is a three-place open-cockpit biplane powered with either a Curtiss OX-5 or a Kinner engine, selling under the new prices at $2,195 and $4,095 respectively.

FLIGHT tests of the first American-built fourteen passenger Savoia-Marchetti were recently completed by the American Aeronautical Corporation of New York, manufacturers of the plane. Carrying a useful load of 3,000 pounds, the ship attained a high speed of 144 miles per hour and a cruising speed of 122 miles per hour. The ship is scheduled to make a flight to Buffalo, N. Y., Cleveland, Ohio, and Detroit, Mich.

The fourteen-passenger Savoia-Marchetti is powered with two Isotta-Fraschini 500-horsepower engines in tandem.

DEMONSTRATIONS to show the instantaneous opening of Floyd Smith parachutes were conducted recently at Roosevelt Field, L. I., by Air Transport Equipment, Inc., of Garden City, L. I., distributors of Floyd Smith 'chutes. A jump

(*Continued on next page*)



THERE'S DOLLAR-FOR-DOLLAR VALUE IN THE GOLDEN EAGLE

THE first point of consideration in the purchase of an airplane is: "Are you getting your money's worth?" Don't look for the answer to that question in steel, fabric and paint, but look for it in the air. Ask yourself, "How much ***performance*** am I getting for my money?" The plane which can "stand up and take it" and still deliver high performance month after month, this year . . . next year . . . and for a few years to come, is the ship which is going to give you real dollar-for-dollar value. Better than you'll get anywhere else.

Here's your answer—the Golden Eagle! Performance *plus* and beauty beyond comparison. We say without fear of contradiction that the Golden Eagle is the most beautiful plane on the market. It creates a pride of ownership which minimizes sales resistance even before the prospect is approached. You can't beat this combination anywhere: High Performance. Low cost per hour operation. Small initial investment. Low depreciation. Minimized upkeep costs. Beauty of color and line.

We have just moved our factory from the West Coast to Columbus, Ohio, where we are closer to the source of supplies and materials. Our manufacturing costs, consequently, have been reduced . . . and so we pass these economies on to you with the following new prices:

Golden Eagle *Chief*, Le Blond powered F.O.B. Flyaway	$3650
Golden Eagle *Jr. Pursuit*, Kinner powered F.O.B. Flyaway	$3750
Golden Eagle *Gipsy*, Wright Gipsy powered F.O.B. Flyaway	$3750

We are creating a demand for the Golden Eagle that will make every franchise a valuable investment for the dealer who holds one. Our policy is to make money for our dealers . . . to help them, with every possible cooperation, to sell more ships than any other light plane dealers. By boosting our dealers we boost ourselves. We have just begun our new campaign and still have some sales territory open to wide-awake individuals or companies. Get in touch with us quickly—territorial assignments are rapidly being made to responsible parties.

The GOLDEN EAGLE AIRCRAFT CORP.
R. O. BONE, *President*
PORT COLUMBUS, COLUMBUS, OHIO

Pacific Coast Representative: J. J. Bouey, West Coast Aviation, Inc., 402 Seaboard Bldg., Seattle, Washington.

(*New York News continued*)

from an altitude of 1,500 feet was made in addition to a jump from 500 feet and a dummy test from one hundred feet.

DESIGNED as a convertible cabin and open-cockpit plane, a Savoia-Marchetti three-place amphibion equipped with a glass enclosed cockpit has been test flown at the New York Seaplane Airport of the American Aeronautical Corporation at Port Washington, L. I. The ship may be converted from a cabin plane to an open-cockpit type by removing the glass and other partitions of the cabin.

THE airplane fleet of the New York Police Department will be augmented with two Savoia-Marchetti amphibions purchased from the American Aeronautical Corporation of New York, according to a recent announcement of officials of the American Aeronautical firm. These ships are three-place flying boats equipped with retractable landing gear. They will be painted in black and green, the colors adopted as the standard of the Police Department when the aerial branch was formed last year.

CENTRAL NEW YORK

[M. MARVIN]

ROBERT C. HAYES, president of Hayes Aviation, Inc., recently announced that plans have been completed for further development of the Hayes Airport at Cicero, N. Y., this year. Under the plans announced a part of the field 2,500 feet square will be completely developed at once to provide an all-direction landing area of adequate size. After this development there will still be strips of land 600 feet wide on one side of the field and 700 feet on another side which will eventually be developed and used for improved emergency runways, providing surfaced areas for landings in bad weather, yet not affecting the main field.

ERNEST B. HANNAM, general manager of the Empire Air Transport, Inc., recently announced that radio equipment will be installed in airplanes of the Empire company during the coming summer. Robert Aller and Robert Wood, operators of the Onondaga Hotel Station WFBL, are constructing three portable radio transmitters for use on the Empire ships. These sets will provide two-way communication between the ships and the ground, and are being constructed with the idea of eliminating all unnecessary weight.

The Empire transmitters will be of 50 watts power, and will have a range of more than 100 miles, according to the designers. Empire planes flying from Buffalo or Albany to Syracuse can keep in constant communication with the Amboy-Syracuse field. The Department of Commerce has issued licenses to Empire Air Transport for the three transmitters.

THE Seneca Flying Club organized in Seneca Falls, N. Y., last winter, recently held a business meeting at which the following officers were elected: Rupert Carpenter, president; George Stublefield, vice president; Richard Hosley, secretary, and Raymond L. Acre, treasurer. The club is planning to form a number of clubs of ten members each in the surrounding towns.

MAJOR GEORGE A. VAUGHN, JR., president of the Eastern Aeronautical Corporation of Newark, N. J., recently announced the apointment of Bayard Livingston Kjelgaard, of Elmira, as director of sales in the Syracuse territory for the General Aviation Company. Mr. Kjelgaard was a World War flier, and included in his activities the work of final test inspector of airplane engines at Kelly Field, and an instructorship of aerial photography and observation at Kelly and Langley Fields.

A DEFINITE step was recently taken toward the establishment of an airport for Auburn, N. Y., when the city council authorized Mayor Charles D. Osborne to enter into an agreement with the American Airport Corporation for the purpose of selecting a site. Airport experts representing the corporation with representatives of the city will select three of the best sites to be found near Auburn. The American Airport firm will, according to the agreement, lay out plans for the building of runways, hangars, buildings, a clubhouse, parking areas, and will also estimate the cost of such a layout.

THE Syracuse Flying Club, formerly the Syracuse University Flying Club, will purchase a new plane this spring, according to plans of the club's officers. The club now owns an OX-5 biplane but increased membership necessitates the purchase of a second plane.

W. L. HINDS, vice president of the Crouse Hinds Company of Syracuse, recently stated that more than two hundred municipal and privately owned airports are planning to install complete lighting equipment for night flying during the present year. This is exclusive, Mr. Hinds says, of the additional lighting equipment that will be added to those airports already partially equipped, as well as a number of airports that are indicating plans for initial installation of individual pieces of such equipment.

BUFFALO

A CONTRACT was recently signed under which the Commercial Investment Trust, Inc., of New York City will finance wholesale and retail sales made on the deferred payment plan by the Consolidated Aircraft Corporation of Buffalo, N. Y. The contract includes sales of aircraft and aeronautical accessories made by the Consolidated company in the United States and Canada to private owners, airline operators and aviation schools.

R. W. FULTON has been appointed general sales manager of the Consolidated Aircraft Corporation of Buffalo, with headquarters located at the Consolidated factory. Mr. Fulton was formerly sales manager of the Colonial Flying Service.

[A. W. SHEPHERD]

ANOTHER Buffalo aviation club is being organized by P. J. Bryans, a member of the engineering staff of the Curtiss plant at Buffalo. Mr. Bryans plans to arrange a series of lectures on the construction of aircraft, stress analysis, aero-

(*Continued on next page*)

P. & A. Photo

New York's aviation squad with Rodman Wanamaker, 2nd, Aviation Aid to Police Commissioner Grover A. Whalen in charge

Aviation's *One* Spark Plug that *Insures* Better Performance

Elinor Smith (left) broke the world's altitude record for women over Roosevelt Field, New York, March 10. She used Champion Aero A Spark Plugs, of course.

Barney Zimmerley (right), using Champion Spark Plugs, set the new world altitude record for light planes at 27,350 feet, over St. Louis, February 16.

LIKE the Champion Spark Plugs for motor cars, motor boats, outboards and racing engines, Champion's new Aero A does give *better performance* to every type of airplane engine.

Developed after three years of most exhaustive tests and experiments, the Aero A incorporates principles which also bring to all aviation engines a new and greater factor of safety and dependability.

These features have won for the Aero A instant recognition and a rapidly growing demand from transport lines, mail lines, racing flyers and private owners, alike.

The Aero A is the first great basic advance in spark plug design to meet the specific needs of aircraft engines.

The Aero A *cannot be broken in such a way as to interfere with engine operation.* Its carefully proportioned restricted bore permits the use of this spark plug in practically every type of modern radial air-cooled, and high compression water-cooled engine.

Its exclusive dual sillimanite insulators withstand a maximum of oil without fouling, and are so designed that the primary is completely protected by the secondary dome insulator. Its heat range is so great that pre-ignition is unknown. Special analysis electrodes resist all the regular ills of pitting and burning. Its specially molded copper gasket seals are permanently gas tight.

Champion's better performance in every engine is known and recognized the world over—on land, water and in the air.

Champion *Spark Plugs* for Aviation

TOLEDO, OHIO **WINDSOR, ONT.**

(*New York News continued*)

dynamics, theory of flight, motor mechanics, navigation, and meteorology to be given by qualified instructors once each week. The membership fee will be $10, with dues of $1.00 per month.

Social activities of the association are expected to provide further revenue, and eventually it is hoped that funds sufficient to purchase a club plane will be obtained. It is anticipated that about fifty will be enrolled, as the program includes every phase of aviation and is not limited to flying activities.

GEORGE E. MARLATT, who for the last eighteen months has been Ford operations manager at the Buffalo Airport, has left for the Cleveland Airport where he will assume the position as manager of Stout D. C. Airlines. Paul G. Woods of Detroit, who has been assisting Mr. Marlatt will fill the vacancy at Buffalo. Mr. Marlatt is a director of the Aero Club of Buffalo, a director and vice chairman of the aviation show, and has had a leading role in all activities at the airport.

CAPTAIN LOWELL H. SMITH, U. S. Army Air Corps round-the-world flier, who has been stationed at the Curtiss plant in Buffalo for the past eight months has been transferred to Bristol, Pa., to supervise the construction of Army bombers being built at the Keystone plant. Captain Smith flight tested all of the Curtiss Condor twin-engined bombers constructed in Buffalo this winter.

CONNECTICUT

DON L. BROWN has been elected president of the United Airports of Connecticut and will be in charge of the airport to be constructed at East Hartford, Conn., adjacent to the new aircraft engine plant of the Pratt and Whitney Aircraft Company and the factory of the Chance Vought Corporation. Mr. Brown is vice president in charge of manufacturing of the Pratt and Whitney company. The work of developing the airport will be started this summer.

Bernard L. Whelan has been appointed operations manager of the airport. Officers of the United Airports of Connecticut include Charles W. Deeds, vice president, and J. F. McCarthy, secretary-treasurer. Mr. Deed[illegible] secretary-treasurer of United Aircraft and Transport Corporation and the Pratt and Whitney Aircraft Company. Mr. McCarthy is assistant secretary-treasurer of the United corporation.

Sikorsky Completes Engineering Building

CONSTRUCTION of a building for the use of its engineering department has been completed by the Sikorsky Aviation Corporation at its Bridgeport, Conn., plant, according to a recent announcement of officials of the company. The building contains equipment for experimental and laboratory work in the construction of aircraft, and a large assembly bay in which the Sikorsky S-40, a forty-passenger four-engined transport, will be built. A vertical wind tunnel and apparatus for the study of chemical alloys, corrosion and the testing of stresses will be contained in the engineering building.

PURCHASE of the trade name, stock, tools, jigs and fixtures of the Unishear Company of New York City has been made by the Stanley Electric Tool Company of New Britain, Conn., subsidiary of the Stanley Works of New Britain. The Stanley Electric company will continue the manufacture of sheet metal cutting tools, formerly produced by the Unishear company, at its New Britain plant.

THE Sikorsky Aviation Corporation of Bridgeport, Conn., has established a school for airplane mechanics at its factory, and furnishes with each Sikorsky amphibion sold the services of a mechanic trained in the shops of the company.

Men who have had previous mechanical training are given from three to six months' work in the service machine shop or with the service ground crew at Bridgeport. Instruction includes methods of repairing all parts of a plane with the exception of the landing gear, engine and instruments.

The men are then transferred to the flight mechanic group and later, through the cooperation of the Pratt and Whitney Aircraft Company, spend two weeks at the Pratt and Whitney plant at Hartford, Conn., where they learn, through practical instruction, the repair of Pratt and Whitney Wasp and Hornet engines. When a mechanic has completed the course of instruction he is assigned to the next Sikorsky plane delivered, following the passing of the Department of Commerce examination for an aircraft mechanic's license.

THE Russell Manufacturing Company of Middletown, Conn., recently opened a branch office at 411-414 Interim Warehouse Building, Detroit, Mich. The Russell company manufacturers Rusco aeronautical products. The sales of Rusco products in Ohio, West Virginia, Kentucky, Southern Illinois, Indiana, Michigan and parts of Pennsylvania will be supervised from the Detroit branch which will be under the management of F. Fuhrman.

THE Red Wing Flying Service, Inc., of Ware, Massachusetts, conducted a successful campaign of passenger-carrying, stunt flying and exhibition parachute jumping in all portions of the United States during 1929. While 25,569 passengers were taken aloft during that time, and 153 exhibition jumps made by parachute, not a single injury to any person was recorded.

Chief pilot Roy J. Ahearn flew a total distance of 85,000 miles in a period of 850 hours, and from January 1, 1929 to December 31, 1929, the sum of $56,667.48 was paid by those who rode in the five-passenger New Standard airplane of the organization. The states into which the service carried its activities included Massachusetts, Connecticut, Vermont, New York, Georgia, Florida, Alabama, Ohio, Illinois and Colorado.

The Red Wing Flying Service, Inc., was organized in 1929, and its organization was centered about the chief pilot, Roy J. Ahearn, who had more than 4,000 hours of flying time to his credit. Mr. Ahearn's plan was to promote airports or emergency landing fields in towns with 15,000 population or over and into these towns he carried his campaign.

A. O. PAYNE has been appointed sales engineer for the Russell Manufacturing Company of Middletown, Conn., manufacturers of Rusco aero products. Mr. Payne will establish headquarters at East St. Louis, Ill., and will represent the company in the Central States as far west as Omaha.

THE Billings and Spencer Company of Hartford, Conn., recently opened an office and warehouse at New York City, according to a recent announcement of officials of the company. The New York branch of the company will be supervised by Roy Moore who has been appointed sales manager of the Metropolitan District.

RHODE ISLAND

[T. F. BRESNAHAN]

A NEW passenger and freight line was established between Providence, R. I., and New York, March 1, when a Ford tri-motor plane of the Eastern Air Express, operators of the line, made its first trip between the two cities with a number of Providence officials. One round trip is to be made daily, the plane leaving the Providence Airport in Seekonk in the morning and returning late in the afternoon.

NICHOLAS BERTOZZI, owner of the What Cheer Airport at Pawtucket, is expending an additional $25,000 to make the port one of the best in New England. Runways at the field are now in excellent condition, the shortest runway measuring 2,600 feet and the longest 3,200 feet. The approaches are good, and multi-motored planes have no trouble landing or taking off. A few low spots are being filled, and a new $7,500 building, which includes rest rooms, and shower baths for the use of visitors is now ready.

The Curtiss-Wright Flying Service, operators of the field are preparing for a big year locally. Arrangements for night lighting equipment are now being made, according to a statement of G. Haines Felton, business manager. Charles Weaver is sales manager at the Pawtucket field, Douglas Harris is chief pilot, and George Cohen, chief mechanic.

THE Pawtucket Business Men's Association has appointed a committee to investigate the possibilities of a city-owned airport. For some time there has been agitation for the city to secure the What Cheer Airport, which is located within the city limits.

THE Providence Airport Corporation at Seekonk, R. I., reports a successful winter season, the planes of the company having been kept busy on every fair day.

(*Continued on next page*)

BLIND FLYING

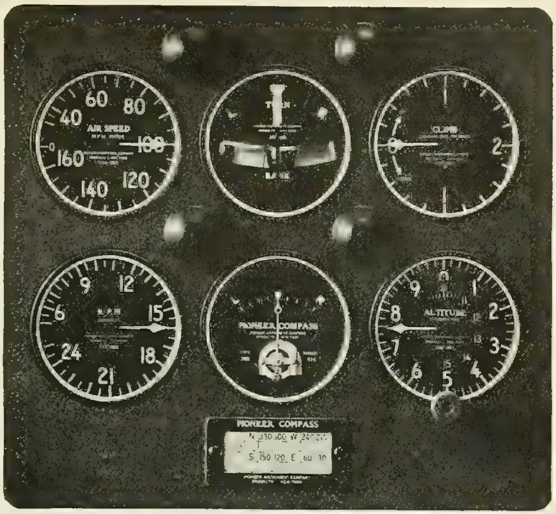
Thanks to the instruments which have been created by Pioneer engineers, it is now possible to fly an airplane "blind" through fog or cloud, by day or night, for an indefinite length of time, and without undue effort or mental strain. Blind flying requires training and practice, but with the help of Pioneer instruments it can be done by any pilot. The essential instruments are the Bank and Turn Indicator and the Climb Indicator. Both were *created* by the Pioneer engineering organization—and both are fully covered by Pioneer patents.

Another outstanding creation of Pioneer engineers is the Earth Inductor Compass, which has been used with such success by Lindbergh, Byrd, Chamberlin, Kingsford-Smith, and so many other famous pilots.

Of hardly less importance are the developments and improvements made by Pioneer engineers in the older aircraft instruments:

Remember the old clumsy flat-card compass? Pioneer engineers developed the side-reading Pioneer compass, which is available in types to suit every airplane and is now the American standard. It is small, compact, accurate and thoroughly satisfactory. And in it compass compensation has been revolutionized by the Titterington Micrometer Compensator.

Not so long ago tachometers were used to help guess how fast the engine was running. Then Pioneer engineers created a new centrifugal tachometer which is accurate to 10 r. p. m.—and holds its accuracy. And it is steady, even when driven by unusually long lengths of flexible shafting.



Air Transport Panel Type 520

Similarly the old unreliable pitot-venturi type air speed indicator has given way to the pitot-static type which operates accurately from any one of a series of interchangeable pitot-static tubes made to suit all sorts of installation requirements—thanks largely to Pioneer engineers who solved the problems which made this possible. For 100% operation, even when ice is forming on the wings, the Pioneer electrically heated pitot-static tube is used by air transport lines.

By the reduction of "lag" almost to the vanishing point, as a result of years of research and experiment, Pioneer engineers created altimeters far more accurate and dependable than any previously available. The newest, as used in the Transport Panel, has provision for rotating the mechanism as well as the dial, so that the hand may be kept horizontal at any altitude and the instrument used as a level flight indicator.

The Pioneer Engineering Department does more than merely meet the needs of aviation as they are presented. Pioneer engineers are always at work on new devices which the aircraft industry is going to need—two, three, and even five years from now. The Pioneer engineering and research organization is your assurance that the Pioneer instruments you buy today are the best it is possible to produce—and your promise that next year's instruments shall be even better.

PIONEER INSTRUMENT COMPANY

DIVISION OF BENDIX AVIATION CORPORATION

754 LEXINGTON AVENUE . BROOKLYN NEW YORK

309 DEARBORN BLDG., DEARBORN • 639 SO. SAN PEDRO, LOS ANGELES • 15 SPEAR ST., SAN FRANCISCO • 420 W. DOUGLAS ST., WICHITA • 5034 W 63RD ST., CHICAGO
527 SUSSEX ST., OTTAWA • STERNPLATZ 13, JOHANNISTHAL-BERLIN • GENERAL EUROPEAN REPRESENTATIVE, M. CALDERARA, 11 BIS RUE MONTAIGNE, PARIS, FRANCE

(Rhode Island news continued)

Jesse K. Fenno is general manager of the concern. The field operated by the organization is equipped for night flying.

NEW JERSEY

LIEUT. W. W. WHITE has been appointed chief test pilot for the aviation department of the Standard Oil Company of New Jersey, according to a recent announcement made by Maj. E. E. Aldrin, supervisor of the aviation department. Lieut. White recently established a new record of five days, five hours total elapsed time, and fifty-two hours, fifteen minutes, actual flying time, between New York and Buenos Aires. He flew a Lockheed plane and was accompanied by Lieut. C. McMullen as co-pilot.

APPOINTMENT of the Clevenger School of Aeronautics, Mexico City, Mexico, as distributors of airplanes manufactured by the New Standard Aircraft Corporation of Paterson, N. J., was announced recently by George Daws, sales manager of the New Standard company. The Clevenger school recently accepted delivery on the first New Standard plane, a Kinner-powered trainer.

A NEW gasket compound known as Nacotex has been developed by the National Cork Products Company of Newark, N, J., manufacturers of Naco Cork Gaskets, according to a recent announcement of officials of the company. The compound is prepared for use on new or old gaskets which have become worn, and is designed to resist heat without crumbling, drying out, becoming spongy or blowing out under high pressure.

THE Graf Zeppelin will make a flight from Germany to the United States in May, according to a recent announcement of Dr. Hugo Eckener. The route of the proposed flight is from Friedrichshafen to Lakehurst, N. J., by way of Rio de Janeiro, South America. The flight will be made for the purpose of determining the feasibility of establishing regular commercial dirigible service between Europe, South America and North America.

THE General Cable Corporation has acquired the Peerless Insulated Wire and Cable Company of Pennington, N. J. The Peerless company will continue the manufacture of Peerless brand wire under the same management and will be operated as part of the Standard Underground Cable Company, Division of General Cable Corporation.

PENNSYLVANIA

EDWARD J. LAUTH has been appointed commercial manager and temporary field manager of the Pittsburgh-Greensburg Airport, near Greensburg, Pa., according to a recent announcement of officials of the Main Aeronautics Company which owns and operates the field. Mr. Lauth will be in charge of the sales of Ryan, Waco and Avian airplanes which are distributed by the Main company, and will supervise the air transport operations of the Main Flying Service, Inc.

THE consolidation of the Milwaukee and Pittsburgh manufacturing facilities of the Hamilton Standard Propeller Corporation has been completed, and the plant is now in operation in the new building at Homestead, Pa. The consolidation has been carried out under the supervision of E. E Wilson, the new president of the firm.

This consolidation places under one roof, in a new three-story building, all the special machinery and equipment of the Standard Steel and Hamilton plants. In order to assist in further development, both the Milwaukee and Pittsburgh production lines were moved intact into the new building. Personnel and machinery were transplanted. The Standard Steel shop organization has remained intact, and about half of the Milwaukee personnel have moved to Pittsburgh. All the changes were made without interfering with production.

SCRANTON, PA., is to have a new commercial airport which will be located at Schultzville, five and one-half miles from the city on the Roosevelt Highway, according to plans of the Scranton Airport Corporation which will develop the field. The airport, when completed, will have three runways, one of which will be 2,500 feet long and the other two will extend over 2,000 feet. The site selected covers 180 acres of ground, part of which has been formerly used as a flying-field by the Scranton Airways.

Plans have been drawn up by the Austin Company of Cleveland for the construction of runways, hangars, shops, and an administration building. A sum of $250,000 will be raised by the sale of stock of the Scranton Airport Corporation, the officers of which are Wm. Hallstead, president; Robert B. McClave, vice president, and Harry Belin, secretary-treasurer.

MANUFACTURING companies located at Williamsport, Pa., have adopted the practice of printing on the back of their letter-heads a diagram of the Williamsport flying field with an additional diagram showing the air route from the field to other large cities. The innovation was fostered by the Lycoming Manufacturing Company, makers of airplane engines, as a method of publicity designed to promote airmindedness on the part of the general public.

FIRST prize for the best design of an aircraft engine submitted in an aeronautics competition sponsored by the American Society of Mechanical Engineers has been awarded to Richard L. Schleicher, aeronautical engineer. He designed a 300-horsepower radial reciprocating air-cooled aircraft engine. Mr. Schleicher is a graduate of the School of Technology, Villanova College, Villanova, Pa. The contest was open to all junior members of the American Society of Mechanical Engineers.

JAMES G. RAY, formerly operations manager of Pitcairn Aircraft Co., of Willow Grove, Pa., was recently elected vice president of the company. The organization has appointed H. H. Haeberly, Jr., formerly affiliated with the General Motors Corp., sales manager of the company.

PHILADELPHIA

[R. GARD]

THE downtown ticket office of the Ludington Philadelphia Flying Service was recently moved from its former location in the Benjamin Franklin Hotel to a new office on the ground floor of the Atlantic Building, Broad and Spruce Streets. The new office will be located in the midst of a permanent aircraft show, comprised for the most part of planes sold by the Ludington company.

A SITE for the new aviation headquarters of the 28th Division Air Service, P. N. G., was provided recently when the Philadelphia City Council directed the city solicitor to turn over to the Commonwealth of Pennsylvania a plot of ground adjoining the Philadelphia Airport.

The plot, which is 200 by 400 feet in area, will be used as the site for a two-story aviation building to be erected at a cost of $75,000. The new building will include equipment for instruction in all branches of aviation, photographic and radio communication laboratories, rigging shop, machine shop, ordinance stores, supply depot and lecture rooms.

THE sport of gliding is gradually gaining in popularity in the Philadelphia area. Since the formation of the Philadelphia Glider Club under the auspices of the National Glider Association a short time ago, more than 250 persons have joined the club. The club is being sponsored by the Philadelphia *Inquirer,* Alfred E. Werner, aviation editor, having been largely responsible for the institution of the organization.

Two gliders are under construction at the Philadelphia Airport, being built by employees of the Ludington Philadelphia Flying Service who are interested in motorless flight.

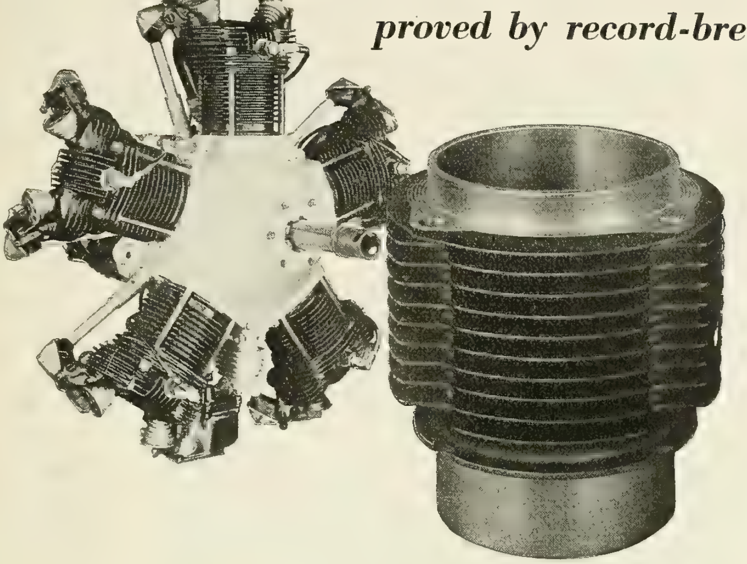
Wes Smith, of the Philadelphia Air Transport Company, recently became a representative in the Philadelphia section for the Detroit Aircraft Corporation for glider sales. He has placed an order for fifty gliders with the latter company and recently took delivery on the first of the motorless ships.

Pilots of Pitcairn Aviation of Pennsylvania have been experimenting for some time with an imported German glider, of the secondary type.

(Continued on next page)

Dependability...

proved by record-breaking performance



Lambert R-266, 90 H.P. airplane engine (upper left). Mfd. by LAMBERT AIRCRAFT ENGINE CORP., *Moline, Ill. Nickel Cast Iron cylinder by Davenport Locomotive & Mfg. Corp., Davenport, Iowa.*

# of Lambert N*ickel* C*ast* I*ron*

Airplane Engine Cylinders

"The longest wearing cylinder material known today*", unquestionably has contributed to the successful performance of the Lambert R-266 airplane engine, ATC No. 38. On Feb. 16, 1930 a plane powered by this engine established an unofficial light plane altitude record of 27,250 ft., furnishing further evidence of the high power and ruggedness built into this engine.

In airplane engine cylinders Nickel Cast Iron has the following characteristics: (1) It resists wear to a marked degree, because of its high hardness, pearlitic structure, refined and uniformly distributed graphite and freedom from hard spots. (2) It is less susceptible to warpage or distortion due to uniform structure even in non-uniform sections. (3) It is tougher in light sections because of refined structure and freedom from hard spots. (4) It is stronger as a result of the refinement of grain and graphite, and the generally improved structural development. (5) It is a scientifically correct cast iron.

Cylinders removed from Lambert engines after more than 500 hours of flying have been found to require no attention whatever. Nickel Cast Iron cylinders show a highly glazed surface on the bore which is probably instrumental in providing longer life.

The Nickel Cast Iron furnished in these cylinders by the Davenport Locomotive & Mfg. Corp. is 15% stronger than the high grade gray iron formerly used and has a hardness of BHN 223. The Lambert Aircraft Engine Corp. report the finished cost of these cylinders is but 45.2% of a steel cylinder. This is partly due to a reduction in finishing time which in turn means increased engine production.

INCO
NICKEL

Nickel
FOR CAST IRON

[See our Exhibit Booths 104-106
A. F. A., Cleveland, May 12-16]

**The description of Nickel Cast Iron by one of America's leading automobile manufacturers.*

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

(Pennsylvania news continued)

A COMPLETELY new set of vanes was recently tested on one of the latest autogiros manufactured by the Pitcairn-Cierva Autogiro Company. While not changed in outward appearance, an entirely new method of manufacture was incorporated in the construction of the vanes. The chief benefit derived from the new construction, and the use of a new wood, is that the vanes lose none of their efficiency through their flexibility.

THE Petz Motor Company of Philadelphia recently obtained the sole sales and service agency for the Siemens-Halske aircraft engines in this country, according to an announcement of Petz officials. In addition to this service, the motor company is completing negotiations with the Siemens concern for the exclusive American rights to manufacture the aircraft engine.

First Pennsylvania State Air Tour

THE date for Pennsylvania's first State air tour has been set from May 30 to June 8. The tour, which is being arranged by the Aero Club of Pennsylvania and the Pittsburgh Aero Club, will start and end at Pittsburgh. Two stops will be made in the Philadelphia district, one at the Philadelphia Airport, and a second at Patco Field.

After leaving Pittsburgh the tentative itinerary is as follows: McKeesport, Butler, Oil City, Bradford, Williamsport, Wilkes-Barre, Hazelton, Allentown, Bethlehem, Philadelphia, Norristown, Gettysburg, Harrisburg, Altoona, Johnstown, and Uniontown, returning to Pittsburgh.

The tour will be under the management of John H. Witherow, secretary of the Aero Club of Pennsylvania, and the committee representing the two clubs sponsoring the event will be as follows: John Vickers, chairman, William J. Austin, Hasley R. Bazley, James D. Condon, Lorin Faurot, John P. Morris, Edward Thompson, Robert E. Lenton, Graham S. Mason, Charles Denby, Jr., J. Wesley Smith, Elwood J. Turner and Robert P. Hewitt.

PITTSBURGH

THE Kinner Airplane and Motor Company has appointed the Pittsburgh Aviation Industries Corporation of Pittsburgh, Pa., the first official sales and service representative for Kinner engines in the State of Pennsylvania. A complete line of parts and tools are carried in stock at the Company's Pittsburgh-Butler Airport.

Irving Air Chute Company also has appointed the Pittsburgh Aviation Industries Corporation of Pittsburgh, Pa., as dealers for its products. Aviation Industries Corporation has established facilities at its Pittsburgh-Butler Airport for the complete servicing, inspection, and repairing of parachutes. Heretofore, it has been necessary to ship all 'chutes in the territory to the Army Air Depot at Middletown, Pa., for servicing.

[BOB COATES]

THE first of the Aeronautical Chamber of Commerce Class C shows for 1929 opened in Pittsburgh March 6 in Motor Square Garden when the doors were opened on the Second Annual Pittsburgh Aircraft Show, sponsored by the Aero Club of Pittsburgh.

A wide range of aircraft was exhibited. Included in the plane display were a Ryan, Waco and Avian, shown by Main Aeronautics Corp.; a Consolidated Fleet, a Thaden all-metal and a Fairchild KR-21 by the Pittsburgh Aviation Industries Corp.; an Eaglerock, by Jack Morris; Franklin trainer, Franklin Aircraft Corp.; Gates convertible by the Gates Aircraft Corp.; Bird by the Issoudun Aircraft Corp.; a complete Curtiss line shown by Pittsburgh Airways and the Curtiss-Wright Flying Service; a Barling NB-3 by the Dawson-Babcock Aircraft Corp.; a Davis monoplane by the Davis Aircraft Corp.; a Heath by the McKeesport Aircraft Corp.; a Stinson by Col. Harry C. Fry, Jr., and a trimotor Ford by the Stout Metal airplane division of the Ford Motor Co.

Construction will be started soon on a number of new Franklin sport training ships manufactured by the Franklin Aircraft Corporation. The ship was shown for the first time at the Pittsburgh show. Two planes have so far been built. The ship has a wing spread of twenty-six feet, is nineteen feet long and has a gross weight of 1,425 pounds. It is powered with a Kinner sixty-five or ninety horsepower engine.

MARYLAND

[E. W. WALSH]

THE Russian aviation commission, appointed by the Civil Aviation Council of the Union of Soviet Socialist Republics, headed by P. I. Baranov, president of the Civil Aviation Council, recently visited Baltimore, Md. The tour of American aviation centers is one of the steps preliminary to the inauguration of a commercial aviation program, planned by the Soviet government. This program includes an expenditure over a five-year period of $108,000,000 for the extension of aviation in Russia, exclusive of the regular sums set aside in the budget for the aviation council.

According to Mr. Baranov the commission was appointed to "see what is going on in the United States." He stated that extensive airline systems will be inaugurated throughout Russia in the future. Airplane services from Moscow to Tokyo, Peiping Stamboul and other capitals widely separated, will be instituted during the next five years, according to the program mapped out by the Soviet aviation commission.

This spring will see the inauguration of an airplane service to China and Japan. The airlines will run from Moscow to Irkutsk and from Irkutsk to Vladivostok where they will connect with Japanese airlines and steamers.

The vast area of Russia, it was pointed out by Mr. Baranov, now without railroad or telegraphic communication, makes air service virtually imperative for communication between the widely separated points.

DR. HUGO ECKENER, commander of the globe-circling *Graf Zeppelin*, plans to visit Baltimore in April and make a survey in order to ascertain the feasibility of establishing a harbor for a transatlantic airship service in the city, according to a recent letter from Dr. Eckener to Mayor William F. Broening. City officials and those prominently identified with aviation and the aviation industry of Baltimore will assist Dr. Eckener and his associates in the survey.

The proposed visit and survey of Dr. Eckener move Baltimore nearer its goal of becoming the western terminus of a transatlantic air service. It has been understood for some time that Dr. Eckener and those associated with him in the development of a transatlantic airline have had Baltimore in mind as a possible American terminus. The geographical location and climatic conditions of the city are considered favorable to the project.

A new impetus has been given to the campaign to have the Navy Department establish one of its new dirigible stations in the Baltimore region by Dr. Eckener's proposed survey of Baltimore. City officials will present Baltimore's advantages before Navy officials. It has been learned that the Navy Department plans to provide additional dirigible stations, each large enough to house an airship of the type of the *Los Angeles*, on the East Coast, on the Gulf Coast, in the interior and on the West Coast. Because of superior climatic conditions, it is felt, that Baltimore has a good chance of being preferred for the new station in the East.

The establishment of a Zeppelin harbor in Baltimore by Dr. Eckener and his associates would be facilitated by the prospect of the Navy establishing a dirigible hangar in this section. Both enterprises, it is felt, would be mutually helpful, because of the unusual requirements for the handling of large dirigibles. With a Navy dirigible base adjoining the transatlantic harbor it would be possible for the Navy personnel to assist in managing the arriving and departing transatlantic airships.

BALTIMORE plans to build a group of terminal buildings at the new municipal airport when it is completed. Because city officials wish to have the airport buildings represent the very latest in design for buildings of the type, the plans will not be made until all the work of preparing the field, filling in behind the bulkheads, laying out the runways and installing the lighting facilities has been completed. It is felt that the rapid advance being made in airport design would make present building plans obsolete by the time they were erected.

UNDER the management and supervision of the Baltimore, Md., office, the Curtiss-Wright Flying Service has opened a branch in Washington, D. C., according to an announcement of Major William D.

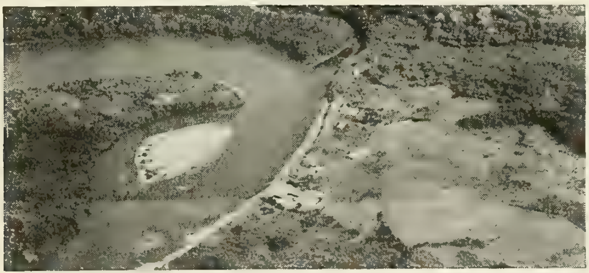
(Continued on next page)

TRAVEL TIME OF 6 *DAYS* *is cut to* 6 *HOURS* *with a* SIKORSKY AMPHIBION

By air travel the Creole Petroleum Corporation exchanges days for hours across South America's oldest republic

The country over which the "Creole" flies varies from river deltas to densely wooded mountain ranges. Plains, lagoons, volcanic mountains and Guiana highlands are targets for the cameras of the Sikorsky Amphibion, "Creole."

Over seacoast, mountains, jungles the "S-38" provides dependable, swift, comfortable transportation



Above photos by Johnson Brothers

This "S-38" Sikorsky Amphibion is used by the Creole Petroleum Corporation—a subsidiary of the Standard Oil Company (N. J.)—for direct transport of employees and aerial surveys of difficult or inaccessible country.

"CREOLE," the Sikorsky Amphibion of the Creole Petroleum Corporation, is particularly well suited to the exacting duties assigned to her. Six hundred miles of mountains, jungles and rivers separate Maturin and Maracaibo, Venezuela. Between these important cities employees of the Company must travel. Ordinarily the trip requires from six to ten days. In the Sikorsky Amphibion the time is cut to six hours.

Luxuriously comfortable, the ship puts every hour of travel in the classification of pleasure. And with her two 420 H. P. "Wasp" engines she has generous reserves of power, with ability to fly and maneuver on either engine. Her usual cruising speed is 110 miles an hour.

Lakes, rivers and lagoons provide perfect landing fields for the "S-38," which is transformed from landplane to seaplane in a matter of seconds. This feature, so essential to a ship used in the Orinoco basin country, is equally important in a ship for intercity use in the States. Many cities whose nearest fields are miles from business centers have suitable water landing facilities close at hand.

Sikorsky Amphibions are proving themselves excellent investments in the service of business and industrial firms, transport lines and individuals. In a folder recently issued there are some rather interesting facts concerning the essential advantages of the "S-38." May we send you a copy?

SIKORSKY AMPHIBION

SIKORSKY AVIATION CORPORATION, BRIDGEPORT, CONNECTICUT
DIVISION OF UNITED AIRCRAFT & TRANSPORT CORPORATION

(Maryland news continued)

Tipton, manager of the Baltimore branch. The new Washington service consists of a ground school and airplane sales department. All flying students will be brought to Baltimore for training. The ground school classes will be held in the Y. M. C. A. building in Washington, and arrangements have been made for the use of Hoover Field for demonstration purposes. The Washington offices of the Curtiss-Wright Flying Service will be in the Southern Building. C. W. McGaughey will be in charge of the airplane sales staff of the new branch.

THE MARYLAND AVIATION PARACHUTE SCHOOL, said to be the only aviation school of its kind in the world, has been officially opened at 1411 South Hanover Street, Baltimore, Md. Three classes are being held weekly, and it is planned to start six classes a week in April. The school was organized to train parachute repairers and inspectors. Lieut. George W. Rogers, is head of this new Baltimore aviation institution.

W. FRANK ROBERTS, chairman of the board of directors of the Berliner-Joyce Aircraft Corporation, of Baltimore, Md., was elected president of the Baltimore Association of Commerce at a recent meeting of the board of directors of the organization held at the Lord Baltimore Hotel. Mr. Roberts was formerly vice president of the association.

BALTIMORE AIRWAYS, operator of a passenger service between Baltimore and New York, plans to enlarge Handler Field, the southern terminus of its line. The service also plans to inaugurate airplane passenger service to Washington, D. C. The airline will be hooked up with the Baltimore-New York air service now in daily operation.

AT THE plant of the Berliner-Joyce Aircraft Corporation of Baltimore, Md., the manufacture of $7,500 worth of airplane is being completed so that it may be destroyed as soon as it is finished. The plane is of a special new construction and is being built for the United States Navy. Because of the fact that little is known of the type of construction used, Berliner-Joyce engineers are preparing for destruction tests to measure the stresses and strains which the fuselage will bear. The assemblage of the metal fuselage, designed for use in an attack plane, has been under way for several months.

In order to determine the stresses which the fuselage will stand without giving way it will be secured firmly, and forces will be applied first at one point and then another. While the forward end is fastened, weight will be applied to the tail and tail surfaces. Instruments placed at points of stress will record the amount the construction gives as the force is increased to a total of 25,000 pounds. This force will not be applied at any one point, the figure representing the total of the forces applied at all points along the fuselage at the same time. In addition to the bending forces which will be applied, torsional forces, tending to twist the structure, also will be brought into play. If the fuselage measures up to expectations a duplicate will be built immediately to be incorporated in the first experimental plane of this type to be built.

A NEW type of parachute received its initial and official tests during February at the Steinmetz Airport, Baltimore, Md. The principles of the 'chute involve a new type of shroud line, which, it is said, enables it to open much quicker than the present type. The 'chute was designed by George G. Schwabeck.

WASHINGTON, D. C.

DEMONSTRATION of the Adams air mail pick-up device was completed recently at Hoover Field, Washington, D. C., before officials of the Post Office Department. During the tests of the device, 202 pick-ups were made, the pilot missing the device once. This device, invented by Dr. Lytle S. Adams of Seattle, Washington, permits a plane in flight to pick up one bag of mail and deliver another simultaneously.

The Post Office Department required 150 pick-ups to be made in the demonstration of the device, 100 to be simultaneous delivery and pick-up, twenty-five separate pick-ups and twenty-five deliveries.

THE Aviation School of America of Washington, D. C., recently acquired the Simons aircraft factory for the purpose of increasing facilities for the instruction of its students, according to a recent announcement of officials of the school. The shops which have been acquired by the school contain over 5,000 feet of floor space and are equipped for the construction of airplanes. Present shop equipment of the school consists of four different types of airplanes and six aircraft engines in addition to accessories and parts.

The curriculum of the school covers all phases of aviation. The shops are under the supervision of Cloud Newman, licensed airplane mechanic; the welding course is supervised by John Saure, graduate of the Army Air Corps welding school; and meteorology and navigation are taught by T. R. Buchanan, formerly instructor for the United States Shipping Board. More than 200 students have been enrolled in the school since its incorporation in 1929.

VIRGINIA

[C. N. SNEAD]

GRADING has been completed at Wood Field, the airport of the Dixie Flying Service, Inc., at Charlottesville, Va. There are three runways on the airport, one 2,000 by 600 feet, one 1,800 by 300 feet and one 2,500 by 300 feet. The grounds at the entrance to the airport have been decorated with boxwood.

A flying club has been organized and a number of members, resident and non-resident, enrolled. The clubhouse is in the charge of Isham Keith, Jr.

PLANS are being considered by the Winchester, Va., Chamber of Commerce for the acquisition of a larger acreage for a new municipal airport which will be dedicated in honor of Rear Admiral Richard Evelyn Byrd. It is planned to equip the field with modern hangars and beacon lights.

KENTUCKY

[A. W. WILLIAMS]

CAPT. FLOYD GALLOWAY, U. S. A., in charge of Army operations at Bowman Field, Louisville, has announced that the first army hangar, his own residence, and the Government office building will be moved to the south side of the Bowman property in order to clear the field. The other hangar further west, will be moved later.

For more than a year an effort has been underway to line up all buildings, and give longer take-off and landing space with the prevailing winds—a factor that was not considered when the buildings were erected. The Louisville and Jefferson County Airboard has announced plans for asking for bids on a concrete taxi strip on Bowman field, for use in periods when the ground is soft.

HUGH O'DANIEL has been named operating manager and chief pilot for the Curtiss-Wright Flying Service at Raleigh, N. C., where he has reported and taken charge. Mr. O'Daniel started at Louisville with the Cardinal Fliers, which was taken over a year and a half ago by the Curtiss Flying Service.

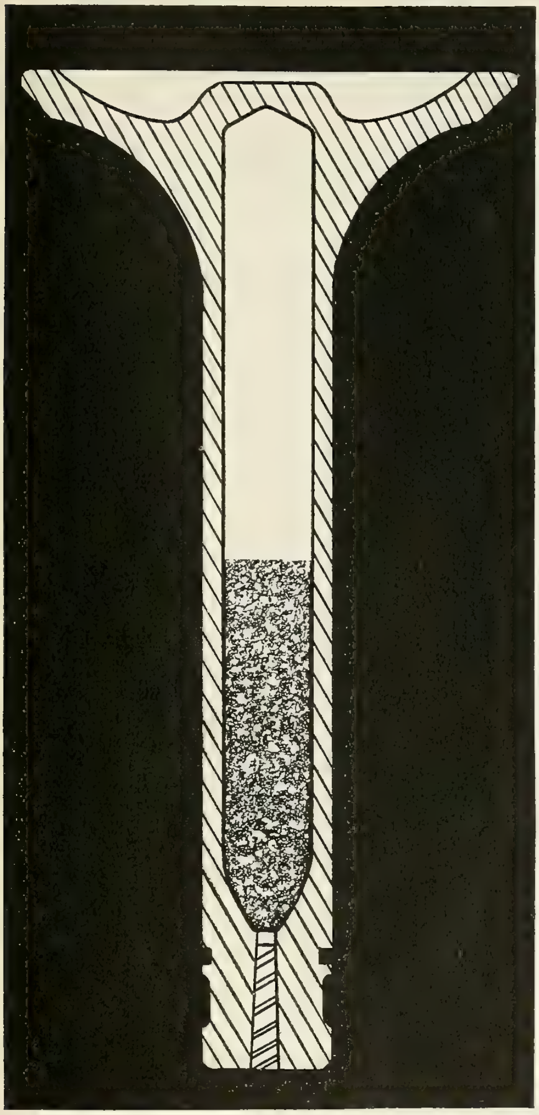
BILLS have been introduced in both divisions of the Kentucky General Assembly to provide for regulation of flying in Kentucky, and to establish a licensing board to approve applications for aeronautical licenses. There has not been any legal regulation heretofore within the state.

OHIO

CONSTRUCTION of the 127th non-rigid airship to be produced by the Goodyear-Zeppelin Corporation of Akron, Ohio, was recently started, according to an announcement of Goodyear officials. More than one hundred of the non-rigid airships constructed in the Goodyear plant have been placed in military service by the United States Army Air Corps and the Navy Department.

The Goodyear-Zeppelin Company has constructed in addition to these airships, 903 captive observation and barrage balloons, one semi-rigid airship, fifty-eight rigid airship gas cells, 105 spherical racing and training balloons, and 2,000 smaller balloons to be used for advertising purposes. The company has also started the construction of the ZRS-4, the first of two rigid airships which the

(Continued on next page)



R.S.P.
RICH
VALVES

What are

SALT-COOLED VALVES

and why?

Salt-cooled Valves are dominant factors in developing high-temperature cooling. Wilcox-Rich is the only manufacturer licensed to make Salt-Cooled Valves.

Salt-Cooled Valves Dissipate Heat

A salt-cooled valve has a hollow stem partially filled with salts which are molten at engine operating temperatures. The rapid reciprocation of the valve agitates the mixture, resulting in a purely mechanical transfer of heat from the valve seat—where temperatures are high, to the valve stem—where heat may be dissipated to the valve guide bushing and the cylinder block. The effective surface available for heat dissipation is thus increased by about six hundred per cent.

Advantages of Salt-Cooling

The salt-cooled valve has the following advantages:

Lower operating temperatures. Salt-cooled valves run "black" under conditions where un-cooled valves operate at "red" heats.

Lessened tendency toward detonation and pre-ignition, due to lower operating temperatures.

Elimination of valve burning, distortion, pitting and wear, will greatly lengthen life.

Improves the fuel consumption by lessening the tendency for detonation with lean mixtures.

. . .

Owing to these important advantages salt-cooled valves offer an opportunity to improve the performance of aviation engines; generally without alterations to the existing design.

manufactured by

WILCOX-RICH CORPORATION, ***Detroit***
World's Largest Manufacturers of Automotive Valves
Sold for Replacement Purposes Exclusively Through
McQUAY-NORRIS MFG. CO. - - ST. LOUIS *and*
KING QUALITY PRODUCTS CO. - - ST. LOUIS

(Ohio news continued)

company will build for the Navy.

[T. E. LUNSFORD]

CHEAPER production of airplanes and the technical developments in the aeronautical industry will be the principal subjects discussed at the fourth annual convention of the aeronautical division of the American Society of Mechanical Engineers, to be held in Dayton, May 19 to 22. Charles W. Ripsch, president of the Dayton section of the society, has announced that the program is now nearing completion and will include among the speakers Lieut. James Doolittle, Claude Dornier, Lieut. A. F. Hegenberger, Major G. E. Brower, and Elmer A. Sperry.

The papers presented will cover both lighter-than-air and airplane types. Thirty papers will be read, treating of problems of design and construction practice, aerodynamics, engine performance and fuel problems, variable pitch propellers, quantity production, metal plane development, flying boats, autogiros, blind flying, airline operation and aerial law. Part of each day will be devoted to inspection trips to Wright Field and airplane and accessory factories. Some sessions will be held at Wright Field.

A production conference also is scheduled, and to it four of the thirty papers are devoted. Reduction of airplane production costs will be discussed by J. Don Alexander; Russell F. Hardy will speak on airplane design from the viewpoint of cheap production; Rex W. Beisel will talk on design, manufacture and sale of commercial and military planes, and R. S. Damon will present problems of airplane quantity production.

COLUMBUS

[W. DONALD WALTER]

LIEUTENANT RICHARD MOREHOUSE, Air Corps Reserve, has successfully passed the necessary examinations for enrollment as a flying cadet in the Air Corps, Regular Army, and reported with the March 1st class at Brooks Field. Lieutenant Morehouse, although not a rated pilot or observer, has had considerable passenger time at Norton Field. The reserve officers attached to this station wish him every success in the hard grind at Brooks and Kelly.

T. A. T.-MADDUX ships continue to carry capacity loads into and out of Port Columbus. Two or more sections have become the rule rather than the exception. What was formerly heavy traffic for T. A. T. has now come to be regarded as normal, and the passenger lists continue to fill the Fords and Condors. One of the latter was recently flown to New York for overhauling and recovering.

Señor Castro, who is training at the Great Lakes plant in Cleveland

THREE PT's from Norton Field made a cross-country formation flight in February from Columbus to Fairfield and return to permit officers attached to the Columbus station to undergo semi-annual Form 64 physical examinations. Lieutenant McConnell led the formation; the other officers making the trip were Captain T. B. Brown, Lieutenant A. E. Harter, and Lieutenant Don Walter.

COLUMBUS City Council has authorized the Department of Commerce to erect and operate a radio beacon station at Port Columbus. Construction on the station will be started at once.

MAJOR MUEHLENBERG, Air Officer for this corps area, was the speaker at the February group school for reserve officers, held at Fort Hayes, Columbus. The Major gave the officers a comprehensive outline of the duties and uses of observation aviation, showing how it is vitally associated with the other branches, and concluded the school session with two reels of official Air Corps moving pictures.

IT is reported that Norton Field is to receive two O-11's, Curtiss Falcons with Liberty engines, one for Major Muehlenberg and one for the use of the Reserve officers, who have long been requesting service type airplanes. The O-11 has been furnished to a number of National Guard outfits, but the Reserve Corps has not been so fortunate, and up to this time, due to lack of funds for the furnishing of service type ships, Norton Field has been unable to obtain anything more powerful than Hisso-powered PT's.

THE Golden Eagle Aircraft Corporation, formerly of Inglewood, California, has moved its machinery and equipment to Columbus, and temporary factory quarters have been established in the municipal hangar at Port Columbus. Officials of the company expect to erect a factory building at the Port by next fall; the temporary plant in the city hangar will take care of the present orders now on file.

The first ship to be produced in the new location was assembled early in March and was test flown by Major William F. Centner and by Jack Helm, Golden Eagle test pilot. The Golden Eagle is a light two-place open parasol monoplane, designed for sport and training use. It may be powered with any of several production engines of from 75 to 110 horsepower.

Major Centner and the Aeronautical Division of the Columbus Chamber of Commerce are primarily responsible for the location of the Golden Eagle factory in Columbus. Due to the favorable geographic location of this city, the uniformly good meteorological conditions, and the flying facilities of Port Columbus, it is expected that this factory is the first of a number of aeronautical manufacturing plants which will locate at Columbus.

CLEVELAND

L. W. GREVE, active head of the Cleveland Pneumatic Tool Company, makers of Aerol shock-absorbing struts for aircraft, sailed March 29th on the maiden voyage of the *Europa* for a three-months' business and pleasure trip abroad.

He will land at Cherbourg and visit the principal cities of France, Spain, Switzerland, Austria, Germany, Sweden, Denmark, Belgium, England, Scotland, and Russia. Mr. Greve expects to survey all of the principal airports overseas and conduct other investigations in connection with the international sale of the company's products.

SENOR JORGE A. CASTRO, A., of Costa Rica has been appointed a member of the personnel of the Great Lakes Aircraft Corporation of Cleveland, Ohio. He is a son of the Costa Rican ambassador to the United States. Upon completion of his work with the Great Lakes company, Señor Castro will return to Costa Rica where he will aid in the promotion of commercial flying in that country.

Señor Castro's affiliation with the Great Lakes concern is in line with that company's policy of obtaining personnel among young men from Central and South America and training them in American aircraft manufacturing and distributing methods in a program of development of aircraft export trade in Latin America.

A PLANE equipped with a Packard Diesel aircraft engine was flight-tested by personnel of the Thompson Aeronautical Corporation of Cleveland, Ohio, according to a recent announcement of officials of the company. The tests were made for the purpose of compiling data on the performance of this type of engine to determine the advisability of equipping planes operated by the Thompson company with Packard Diesel engines.

A PROPELLER pitch setting stand has been installed at the Thompson Aeronautical Corporation's Cleveland aero repair depot. The stand was made by the New Hampshire Aviation and Marine Company of New Hampshire. It is complete with mandrels for testing and setting the pitch for all makes and types of propellers in use.

ESTABLISHMENT of a downtown emergency landing field and construction of runways at the Cleveland Municipal Airport are two improvements which are expected to result from the most current

(Continued on next page)

Kittyhawk Specifications:

Engine—Kinner K-5	100 h. p.
Approved Type Certificate No. 166	
Length overall	22 ft. 11 in.
Height overall	8 ft. 8 in.
Span both wings	28 ft.
Chord both wings	4 ft. 6 in.
Wing area	233.4 sq. ft.
Weight empty	1107 lbs.
Useful load	768 lbs.
High speed	110 m. p. h.
Cruising speed	90 m. p. h.
Landing speed	38 m. p. h.
Climb	1200 ft. p. m.

Also Approved Type Certificate as a Seaplane

Some planes are built for speed

But to gain superiority in either speed or stunt performance, a plane must sacrifice safe flying qualities. The Kittyhawk will travel 110 miles per hour . . . it will out-perform most planes in its class . . . but we have not attempted to develop these features at the expense of safe flying.

The Kittyhawk is a light, three-place biplane . . . built for training, commercial and private use. With a landing speed of 38 miles per hour . . . with a wheel tread of 7 ft. 2 in. . . . an inexperienced pilot can get into or out of small rough fields with a greater degree of safety.

Try to spin the Kittyhawk . . . a few skilled pilots have been able to hold it in a spin for three or four turns . . . not more. Certainly, this is a feature of safety which few planes can duplicate.

THE VIKING FLYING BOAT COMPANY
89 Shelton Avenue. New Haven, Conn.
Miami Hangar — Causeway Island

Upon request we shall be glad to send you illustrated folders about either the Kittyhawk or the Viking Flying Boat and Amphibian.

THE KITTYHAWK

ALSO MANUFACTURERS OF THE VIKING FLYING BOAT

(*Ohio news continued*)

agitation for a lake-front airport at Cleveland. The immediate cause of the revival of discussion concerning lake-front facilities for the landing of aircraft was a second emergency landing at night in Edgewater Park by a mail flier.

City officials, including Mayor John Marshall and City Manager D. E. Morgan, members of the aviation committee of the chamber of commerce and the local N. A. A. chapter, have had a series of conferences on the subject. Mayor Marshall has stated that the city has $200,000 acquired through the sale of bonds that is available for improvements. Just how it shall be spent awaits the joint approval of Cleveland's aeronautical leaders.

These men are anxious to see a modern and adequate airport established on the lake-front at the foot of East Ninth Street, but this site is involved in litigation that may not be settled for years. Grading of the land, the installation of lights and the burial of wires together with the removal of other obstacles, however, would provide facilities which would be better than those of Edgewater Park.

PREPARATIONS for the opening of spring activities are underway by the Cleveland Glider association, of which L. F. Ross is president, following a recent meeting of all the officers of the five glider clubs affiliated with the association. At this meeting, Donald F. Walker, manager of the National Glider Association, explained the summer objectives of the national organization and outlined plans for the first soaring competition to be staged the latter part of September near New York, according to tentative arrangements.

Mr. Ross appointed two committees, one headed by J. D. Hartshorne to find a hill site from which gliders could be launched for the licensing of third class pilots, and another headed by Otto Pesek to draw plans for a membership campaign. Five new gliders are under construction in the Cleveland area while others are being made ready for flights when the weather moderates.

About one hundred young men are members of the association. The clubs which have affiliated with the central organization are: Case Aero Club, Sailplane Aviation Club, Cleveland Glider Club, U. S. Aeronautical Club and Buckeye Glider Club.

THE Universal Flying School at Cleveland Municipal Airport has been awarded an approved school certificate for both ground and flying training for private, limited commercial and transport licenses. It is the first school in Cleveland to be examined and rated by the Department of Commerce, Aeronautics Branch.

Nine of every ten students accepted must be graduated and qualify for the respective license for which they enroll for the school to maintain its rating. All equipment, ground and flying, must be available and kept in first-class condition. All the instructors have been examined and found capable of teaching the subjects to which they have been assigned. To retain their certificates the teaching staff must take periodical examinations.

ALVA BRADLEY, president of National Air Race and Show Corporation, and L. W. Greve, president of National Air Races, Inc., the two organizations that sponsored the 1929 National Air Races and Exposition at Cleveland last August, jointly announced recently that $40,000 of the profits resulting from the event had been awarded as follows:

An appropriation of $20,000 to be used as an underwriting fund for the International Gordon Bennett Balloon race to be held in Cleveland, August 30, August 31, and September 1; United States Army Pilots Relief Fund, $5,000; United States Navy Pilots Relief Fund, $5,000; National Aeronautic Association, Washington headquarters, $5,000; and Cleveland Chapter, National Aeronautic Association, $5,000. The remainder of the profits from the event will be kept for future decision.

INDIANA

A FLIGHT of twelve hours and ten minutes was completed on March 9 at Indianapolis, Ind., by a Curtiss-Robin powered with an OX-5 90-horsepower engine and loaded with forty-nine pounds of gasoline and one hundred pounds of baggage in an attempt to establish an efficiency record for duration of flight with standard equipment. The engine was equipped with a Miller overhead valve system. The flight was sponsored by the Indiana Aviation Corporation of Indianapolis, distributors for the Curtiss-Wright Corporation, and the plane was piloted by Walker W. Winslow, president of the Indiana company.

A distance estimated at 973 miles was covered on the flight at a cruising speed of eighty miles per hour. The gasoline consumption was 4.02 gallons per hour, and the mileage per gallon of fuel was 19.9 miles.

The plane took off at 5:02 a.m., and landed at 5:12 p.m. A number of nearby towns were flown over and notes on the progress of the flight were dropped from the plane every hour at the Curtiss-Wright Flying Service, Stout Field, Mars Hill, and at the Hoosier Airport.

[R. NUSSBAUM]

H. WEIR Cook, general manager of Curtiss-Wright Flying Service of Indiana, has been re-elected president of the Indiana Aircraft Trade Association. Other officers named include: Paul Cox, vice president; E. H. Jose, secretary; and L. I. Aretz, treasurer. Directors, other than the officers, are H. C. Brooks and C. S. Cornish.

INDIANA Aviation Corporation of Indianapolis has been formed to distribute Curtiss-Wright airplanes and aviation products in Indiana and parts of Illinois, Kentucky and Ohio. Walker W. Winslow, who resigned as sales director of Curtiss-Wright Flying Service of Indiana, is president of the new concern. Other officers are C. L. Zechiel, secretary, and Robert C. Winslow, treasurer.

Dealers named by the new firm include Hoosier Airport and Curtiss-Wright Flying Service of Indiana, both in Indianapolis; Shambaugh Airport, Lafayette, and Aereco Flying Service, Fort Wayne.

MICHIGAN

AN aerial tour of the Orient for the purpose of demonstrating a Ford all-metal trimotor transport plane has been started by Perry Hutton, pilot of the Stout Metal Airplane Division of the Ford Motor Company, sponsors of the tour. The plane was shipped from Los Angeles, Calif., to the Orient in February by the Stout company, the wings and tail group being stowed in special crates in the hold of the steamship. The fuselage with center section and engine in place was painted with oil and shipped on the deck.

[K. F. ZEISLER]

THE WAYNE COUNTY AIRPORT, twelve miles from Detroit, has been unofficially opened, though the hangar and part of the field equipment will not be completed for several months. Concrete runways are a feature of the field's construction.

Directors of the Detroit-Wayne Industrial Airport, Wayne, Mich., have authorized an initial expenditure of $414,050 for grading and hangar construction on the ultimate $2,000,000 development, which is designed to accommodate numerous aircraft plants. The field is a mile square, with three paved highways and a railroad bounding it.

DETROIT

JOHN E. PRATT has been appointed chief demonstrator for gliders manufactured by Gliders, Inc., a division of the Detroit Aircraft Corporation, according to a recent announcement of officials of the Detroit corporation. Mr. Pratt recently completed the glider flying course at the Rhön Rossiten Glider School, Rossiten, East Prussia, Germany. He is a licensed airplane pilot.

TOTAL income, from sales of engines and parts and revenue from service, of the Warner Aircraft Corporation of Detroit, Mich., in 1929 was $637,841 as compared with $188,308 in 1928, according to a report of 1929 activities recently issued by officials of the Warner company. The net profit for the year for normal operations was $6,214, a deduction of extraordinary losses of $46,180 incurred during the year resulting in a final net loss of $39,965.

The Warner company has current assets of $624,375 as of December 31, 1929, against current liabilities of $106,753, leaving a net working capital of $517,622. Included in the current assets are inventories of raw materials, finished stocks and work in process

(*Continued on next page*)

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growing with aviation

Years ago when aviation was in the experimental stage Stromberg was experimenting, too, with an aircraft carburetor. One that would be dependable, light. That would supply the proper fuel mixture to the engine at all speeds, in all positions—efficiently and economically.

Such a carburetor was developed. The difficulties of propeller blast and upside down flying were overcome. A dependable, durable, economical carburetor was designed and built.

The aviation world quickly recognized the remarkably fine performance of Stromberg carburetors. With the result that over 90% of American aircraft flying today is Stromberg equipped. And—as aviation grows, and new planes and new engines are developed—inevitably builders turn to Stromberg for the solution of their carbureting problems.

STROMBERG MOTOR DEVICES COMPANY

(Division of Bendix Aviation Corporation)

58-68 East Twenty-fifth Street Chicago, Illinois

(*Michigan news continued*)

amounting to $560,304. During the year the company purchased a six-acre tract of land in Detroit and erected a new factory.

A NEW engineering department has been organized by the Detroit Aeronautic Products, Inc., of Detroit, Mich., and New York City. W. E. Schaefer, formerly of the Stout Metal Airplane Company, will supervise the new department. The Detroit company manufactures bolts for aircraft construction according to specifications of the Air Corps and the Naval Air Service, and screw machine products for the aeronautical industry.

OFFICERS for 1930 of the Continental Motors Corporation of Detroit, Mich., were elected at a recent meeting of the board of directors of the Continental company. They are as follows: W. R. Angell, president; Roger Sherman, vice president; James H. Ferry, vice president; B. F. Tobin, Jr., treasurer; R. W. Judson, chairman of the board of directors; and Leo M. Butzel, member of the board of directors.

R. S. DEERING was recently appointed general manager of the Verville Aircraft Company of Detroit, Mich. Mr. Deering has been affiliated with the automotive industry for more than twenty years and was formerly president of the Stevens Duryea Company.

KARL S. BETTS has been appointed assistant general sales manager in charge of dealers and distributors by the Detroit Aircraft Corporation of Detroit, Mich., according to a recent announcement of officials of the company. Mr. Betts was formerly affiliated with the National Glider Association, with which he will continue in an advisory capacity, and was formerly associated with the National Air Tours, International Balloon Races for the Gordon Bennett Trophy, and the Detroit Board of Commerce.

TWO ski pedestals have been ordered from the Aircraft Products Corporation of Detroit by the Department of National Defense of Canada, according to Ralph R. Irwin, president of the Detroit corporation. The ski pedestals will be used for experimental purposes on a Ford trimotor all-metal plane and a Fairchild plane. Each pedestal will incorporate two Oildraulic shock absorbers to withstand the landing shock ordinarily absorbed by the inflated tires on the wheels of a landing gear.

There was an increase of 698 per cent of the business of the Aircraft Products Corporation in 1929 over that done in the first nine months of the company's existence in 1928, according to Mr. Irwin's announcement.

W. R. ANGELL, president of Continental Motors Corporation, announces the appointment of Louis J. Kanitz as general sales manager of the organization. Mr. Kanitz joined the Continental Motors Corporation in February, 1920, after resigning his commission as Lieut.-Commander in the United States Navy. For the past three years he has been in charge of the industrial engine division of the company.

IOWA

[R. W. MOORHEAD]

PROPOSED plans for the manufacture of Bolte airplanes under direction of a local board of directors at Newton, Iowa, in conjunction with marketing activities of the Bolte Aircraft Company of Des Moines have been announced. Organization of United Air Activities, Inc., has followed a series of conferences between Newton business men and Henry Bolte of Des Moines, head of the Bolte organization, for the production of the aircraft.

Details of the production plan call for the utilization of the old Miles factory at Newton as headquarters. Seven acres of

(*Continued on next page*)

Michigan's New State Aviation Code

KARL F. ZEISLER

MARCH witnessed the inauguration in Michigan of the new state aviation code, drafted by the State Board of Aeronautics as the working basis of its regulative activities, and approved, with minor changes, by the attorney general. It is one of the first of such codes to become operative in any state, and has been approved and commended by Federal authorities. The code is based largely on the Federal aviation laws.

It is the plan of the board to institute a regular inspection service of all fields and schools. In order to do this, the board will hire several inspectors to make periodic rounds of all cities with flying facilities. Airports, both commercial and municipal, will be given permanent licenses, as will the schools, to replace the temporary licenses under which they formerly operated. Schools will pay a license fee of $10 for training private license pilots, $50 for commercial pilots and $100 for transport pilots.

The code itself is divided into four major parts, regulating pilots and air traffic, airports, flying schools and the rating of airports. Some of its major features are as follows:

The first section provides that Department of Commerce air traffic regulations covering interstate operations shall be applicable to flying within the state. Aircraft operating in Michigan must be either licensed, registered or identified by the Department of Commerce, subject to further inspection by the state board. In addition to Federal regulations, the following rules are laid down for pilots: Private and limited commercial pilots may not instruct for hire; private pilots cannot carry more than two passengers and limited commercial pilots more than five.

The second section, relating to airports, provides that the board inspect the condition and equipment of all fields, and make a written report to the operator regarding any changes necessary to qualify for a license. Following the licensing of a field, no major change shall be made without the board's approval. Plans for new fields must first be submitted to the board.

The third section relating to flying schools is the most stringent and most detailed. It provides for the examination of schools by the board to determine adequacy of courses, airworthiness of equipment, competency of instructors and the licensing of approved schools. Schools are classified as private pilot, limited commercial, transport and ground schools. Each school is to submit an outline of its courses to the board, keep a log of each student's progress and submit monthly reports.

A school must operate from a field with at least 1,500 feet of effective landing area in all directions, or landing strips 400 feet wide in at least six directions. Hangar space must provide for all training planes and two planes must be in condition at all times. Not more than ten planes per 100 acres of field may be in use at one time, and not more than 15 students per licensed plane shall be enrolled. Ground schools must have one classroom suitably equipped for every hundred enrolled. Their equipment must include three types of modern engines and two types of modern demonstration planes.

The code includes a section for the licensing of airports, and uses the letter-numeral-letter designation of the Department of Commerce rating for landing fields. The department lists forty-five airports in Michigan, twenty-four of which are municipal, thirteen commercial, two Federal, seven auxiliary and one intermediate. Applications for State licenses have been received from forty-four of the forty-five fields.

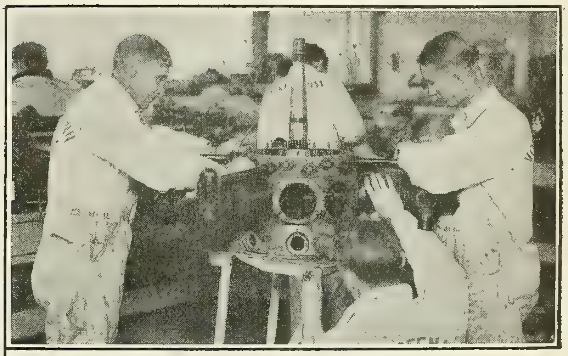
The list of Michigan airports is as follows: *Municipal*: Ann Arbor, Baldwin, Battle Creek, Bay City, Caro, Charlevoix, Detroit, Gaylord, Grand Haven, Grand Rapids, Jackson, Kalamazoo, Lansing, Marysville, Menominee, Muskegon, Niles, Petoskey, Harbor Springs, Pontiac, Saginaw, Traverse City and Ypsilanti. *Commercial*: Alma, Benton Harbor, Dearborn, Detroit, Grosse Ile, East Lansing, Flint, Grand Rapids, Iron Mountain, Northville, Plymouth and St. Ignace. *Auxiliary;* Bad Axe, Cadillac, Detroit, Grand Rapids, Grayling, Munising and Standish. *Federal*: Selfridge Field at Mt. Clemens, and Camp Custer at Battle Creek. *Intermediate*: Monroe.

Michigan's aviation activities are under the control of the State Board of Aeronautics, provided for by a special act of the legislature at its 1929 session. Its membership at present is as follows: William B. Mayo, chairman; Claude S. Carney, Frank L. Betts, Harry Fletcher, Capt. William Sparks, and Capt. Ray Collins, who is secretary and state director of aeronautics. The board maintains permanent headquarters at Lansing, and has been functioning since last fall.

Young Men...

your future depends upon your training

You, who receive instruction now will be the ones piloting ships, building, repairing and testing them a few months hence—providing you receive the proper training. In no other industry is thorough and practical training so essential as in aviation. The School of Von Hoffmann will give you this training. For years this pioneer school of the air has been constantly alert to the necessity of keeping abreast of the rapid advancements in this great industry. Vision and foresight has kept Von Hoffmann's slightly ahead of the rest—a great school with a single purpose—to make each individual graduate the finest type of pilot or mechanic.



Instruction is given on a variety of late types of Government Licensed modern aircraft, open and cabin types. Each instructor has been rigidly examined and licensed by the Department of Commerce as an instructor—which means that he not only has the knowledge, but the ability to impart it—to instruct students in conformity with Government License regulations. Every flight instructor is a transport pilot with two to five thousand hours in the air, and enjoys a wide reputation as a thorough instructor, an efficient pilot, and a safe flyer.

Graduates of the School of Von Hoffmann succeed in aviation because the courses go beyond the Government requirements, and employers know that they have been thoroughly and practically trained for immediate positions. We feel that this is necessary if our students are to maintain the high standards for which Von Hoffmann graduates are noted. That is the reason Von Hoffmann graduates are filling responsible positions throughout the industry—are making good. Our courses cover actual flying, theoretical instruction, aero navigation, airplane instruments and practical shop training in airplane structure and repair of various type planes—motor construction, adjustment and repair of different type motors including both water and air cooled. A Government rated school located on a $2,000,000 airport—comfortable quarters at the school and plenty of activity. No other school in the world can offer you the advantages of Von Hoffmann training. Let us tell you about our liberal time payment plan. Send today for our new illustrated catalog. Make your start in aviation—mail the coupon NOW!

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☐ Flying Course ☐ Mechanics Course
☐ Welding Course ☐ Home Study

(*Iowa news continued*)

ground are connected with the building and an additional sixty acres can be leased. Under the terms of the proposed agreement the United Air Activities corporation will assume complete charge of the manufacture of planes. The entire output of the factory would be handled by the Bolte organization.

A TOTAL of $30,416.89 has been so far spent by the City of Des Moines, Ia., on the operation of the Des Moines Municipal Airport since its beginning, according to a report recently made public by Mayor Mulock. This sum does not include outlay for the hangar, for which funds were contributed with the idea of reimbursement later by the municipality, nor for other expenses borne by Yellow Cab Airways, Inc.

NEBRASKA

AN aero club has been formed at the Santee Normal School, a mission school for American Indians at Santee, Nebr., according to a recent announcement of Henry L. Leigh, supervisor of the club and director of general mechanics and athletics of the Santee school. The club plans to purchase an airplane which will be used to instruct members of the club in flying and airplane construction.

[J. R. Lowell]

A NUMBER of towns over Nebraska are planning to establish well-equipped airports this spring, and work is already in progress at some of them. Plans have been announced by the Boeing company for improvements of the municipal field at *North Platte* which the company has leased. An eighty by twenty hangar will be erected with a forty-foot lean-to for an office and waiting room. The building will be of brick and steel and work will start immediately. Another improvement will be the installation of a broadcasting station for the exclusive use of the Boeing company. Operator Allam, formerly of Oakland, Calif., has arrived and will have charge of the station.

Sidney, on the Boeing transcontinental route, has been named one of seventeen cities in the United States where radiophone towers will be erected to make night flying safer for mail pilots. Bids have been awarded for the erection of five aerial masts at the emergency landing field near the town.

A committee from the *Fairbury*, Nebr., chamber of commerce has taken an option on a quarter section of land near the town to be converted into a municipal airport. A special election will be called for the purpose of voting bonds to purchase the land and erect a hangar and other necessary buildings.

Aurora, a city of 8,000 inhabitants over which the Boeing line passes, is to have an airport this year. A lease has been taken on fifty-five acres of land two miles from the city. The present beacon will be moved to the new field, and a power line is already being run to the site. The work of installing lights and other equipment will start early this summer.

Erection of the building which is to house the radio range beacon at *Fort Crook* is nearly completed, and work will start soon on the installation of the radio apparatus.

Lincoln's new "Union Airport" is being rapidly rounded into shape, the one hundred by eighty-foot hangar having been completed. The Aeronautics Branch of the Department of Commerce has just issued an airway bulletin describing the Lincoln Municipal Airport. Receipts of the Lincoln municipal airport for February show an increase over the preceding month, the income for the month being $338. All of this came from gasoline sales except $32.50, charged for hangar rentals.

An air college with 2,000 students in the charge of Maj. Thomas G. Lanphier is part of the plan of those who are boosting a large airport at *Bellevue*, Nebr. Maj. Lanphier has agreed to head the air college, which will be located on a 400-acre field and which will include Bellevue college, providing that institution can be purchased from Presbyterian church authorities. It is hoped to open the airport this summer.

The *Hastings* city council has voted to purchase 160 acres of land adjoining the city at a cost of $28,000. The city has already raised $50,000 by a bond issue authorized recently at a special election, the entire amount to be spent for a municipal field. The site selected has been approved by Government inspectors.

ELEVEN planes were exhibited at Omaha's first annual combined automobile and airplane show. More than 40,000 persons attended during the six-day period. A number of exhibitors announced that they had received orders for ships during the show. The exhibition was held at Ak-Sar-Ben Coliseum where the planes could be flown to the building and taxied in. The exhibits were as follows: Kari-Keen coupe, Kari-Keen Factory, Sioux City, Ia.; Stearman mail biplane, Hanford Tri-State Airlines, Sioux City; Monocoupe and Monoprep, Rapid Aviation Co., Omaha; Overland Sport Trainer, Overland Airways Factory, Omaha; Curtiss Robin, Sidles Airways, Inc., Lincoln; three Travel Airs, Mid-West Aviation, Omaha; Waco, Pioneer Aircraft Co., Omaha; and a Lincoln PT, Lincoln Aircraft Co., Lincoln. Aeronautical accessories were also displayed.

MID-WEST LEGISLATIVE AIR CONFERENCE

[W. Scollard]

THE Mid-West Legislative Aviation Conference was held at Milwaukee, Wisconsin, February 24-25. Speakers prominent in the aeronautical industry addressed the conference which devoted attention to a discussion of aeronautical laws and the legislative regulation of the aviation industry, the elimination of inadequate flying schools, and the legislative regulation of airports. A resolution was passed to form a permanent interstate organization to be known as the Midwest States Aeronautical Council. Approximately seventy delegates from Wisconsin, Illinois, Michigan, Minnesota, North and South Dakota, Iowa, Arkansas, and Mississippi attended the conference.

As a result of the discussion of legislative supervision of aeronautics, members present at the meeting agreed that too much responsibility is being shunted on the Federal Government by the states and that state legislatures should devote more attention to the regulation of the industry, Federal requirements serving as a guide. The conference favored the enactment of laws by states incorporating the requirements of the Department of Commerce for the licensing of planes and pilots. The Federal regulation of air rates was opposed by the conference which believed that air transportation companies should be permited to work out rates that will give them a fair return on their investments.

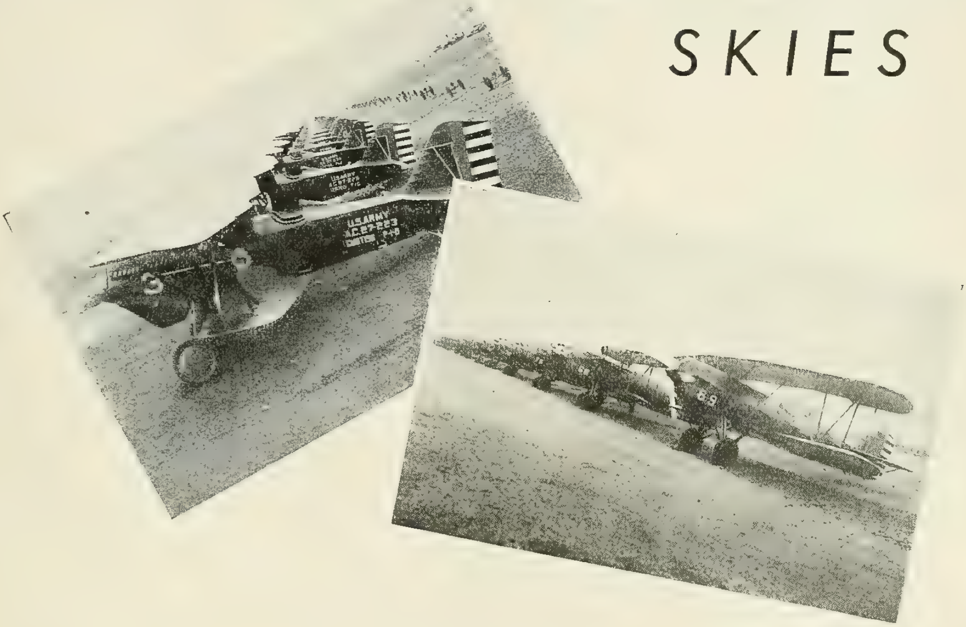
Stringent legislation governing flying schools was favored by some members of the conference while others proposed a lenient legislative attitude toward these schools. It was agreed that the two factors to be considered in regulating flying schools are whether or not students are defrauded and whether flying courses are conducted with maximum safety. The conference voted against a proposed measure which would place flying schools under state supervision.

The regulation of aeronautics in each state by a qualified official or a body composed of qualified personnel was favored by the conference, as well as a resolution that state aeronautical legislation be supervised by personnel qualified to do so. The conference proposed the coöperation of the Federal Government and the states in the development of airways. The members of the conference indorsed the Watres Bill which provides for a change of payment of air mail operators from the poundage basis to a basis of rental of definite space for which the Government would pay by the mile.

A blanket resolution concerning airports and airways was adopted including seven sections. The resolution stated that aviation taxation should be expended solely for aviation; that States provide for the establishment of airports by municipalities and stipulate minimum requirements for airfields; that State systems of airways conforming with Federal requirements be projected; that States require uniform markings of airports according to Department of Commerce standards as well as the air marking of all municipalities; and that they remove confusing aerial markers.

Speakers who addressed the conference included the following: Col. Harry H. Blee of the Department of Commerce; Governor Kohler of Wisconsin; Senator Oscar H. Morris, Maj. Reed G. Landis, George B. Logan, John M. Vorys, Trevor Williams, Earl J. Smith, Rowland W. Fixel, J. B. Neill and Fred D. Fagg, Jr.

GUARDIANS OF OUR SKIES



THE HAWK

SWIFT and relentless bird of prey — streaking aloft on the wings of the wind to convoy a fleet of bombers over the lines, or to repel, with savage fury, an unwelcome visitor at twenty thousand feet.

THE FALCON

SO versatile that it is equally effective as a ground attack plane, swooping low over the tree tops and leaving swift destruction in its wake, or as an observation plane, cruising miles high to ferret out enemy secrets with an all-seeing camera, or to coordinate artillery fire by radio.

BOTH

STANDARD equipment of the U. S. Army Air Corps, both developed under the Curtiss Group Engineering System, in close cooperation with Army Air Corps Engineers, both 100% Curtiss designed, constructed, powered.

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P. & A. Photo

Secondary type glider, remodelled for use on the water, recently flown at the American Aeronautical Corporation's seaplane base near Port Washington, L. I.

KANSAS

INCLUDED in a program of expansion recently adopted by Central Air College, Wichita, Kansas, is the appointment of new personnel and the transfer of the executive offices in Wichita. Monty Barnes was recently appointed head of the transport division of the Central Air College Company. He formerly operated Barnes Flying Service at Chanute, Kansas, and is a former pilot of Central Air Lines. Philip H. McKenzie, formerly of the Airways Division, Department of Commerce, has been appointed supervisor of airplane sales.

E. A. Watkins is president of the Central Air College. He is vice president of Watkins Aircraft Company and president of the Central Division, Universal Aviation Corporation.

[E. W. PRYOR]

THE WICHITA FLYING SCHOOL, in February announced two cuts in the cost of pilot training in its courses. The cuts range from $700 on the transport pilot's license course to $200 on a limited commercial pilot's license. The Wichita Flying school operates from the Wichita Municipal Airport, and has six planes in its fleet, including a Travel Air cabin plane and a Stearman. All planes are being equipped with air-cooled engines for the spring season, and other equipment is being improved.

COMPLETE reorganization of the Cessna Aircraft company was voted at a recent meeting of stockholders when it was decided to double the capitalization of the company. The new program of the firm includes quantity production on gliders, and improvement in present models.

HONORS of the February indoor model plane contest sponsored by the Wichita *Evening Eagle* went to Oscar Kimmell, 14, when his model won the endurance race and the Travel Air loving cup awarded by Walter Beech. The model remained in the air three minutes, seventeen seconds, bettering the Wichita record more than thirty seconds. His twin-pusher model won first in the speed event, traveling one hundred feet in two seconds.

THE WICHITA FLYING CLUB and the Wichita chapter of the National Aeronautic Association were drawn together by the election of common officers at the annual elections in February. Belief that closer cooperation could be obtained in drawing two similar organizations nearer together prompted the two groups to elect the same men to guide their programs.

Marcellus M. Murdock, publisher of the Wichita *Eagle* was elected president of the two organizations, and Jack H. Turner was named chairman of both boards of directors. R. S. Orr was elected secretary-treasurer of both groups, filling the office vacated by resignation of Roscoe Vaughan. Howard Fleeson, Wichita attorney, was elected vice president of the flying club. New members of the board of directors chosen are: Stewart M. Young, W. E. Titus, Alfred MacDonald, J. H. Turner, Clyde V. Cessna and J. B. Gardiner. In the future annual meetings of both the flying club and the N. A. A. will be held at the same time to carry out the cooperative program.

DR. E. C. ELFERT was elected president of the recently organized Hutchinson Glider Club at Hutchinson, Kan. Eldon Dale was elected vice president and manager of the club; Walter Justice, treasurer, and Martin Aelmore, secretary. Membership will be restricted to twenty members to insure sufficient flying time for each.

MISSOURI

[M. SHEETZ]

THE MISSISSIPPI VALLEY AIRWAYS, INC., recently organized at Cape Girardeau, Mo., will act as distributor for Air King planes, operate the Cape Girardeau Airport, a taxi service and flying school. Arrangements have been made for the purchase of 160 acres south of Cape Girardeau for the municipal airport, and actual construction work on the field and buildings will be started as soon as weather permits. Dr. George Huff is president of the new company, and the directors include F. S. Moore, D. A. Heltibrand, D. A. Huff, and S. F. Tannus.

THE SEDALIA, MO., public library is showing a display of aviation material, including air travel literature, pictures of various types of planes and engines, air mail posters and model planes.

J. C. SHELTON, manager of Rosecrans Field at St. Joseph, Mo., for the Fairfax Airports company, reports a marked increase in flying activity at the St. Joseph field. The Mid-America Flying School, the St. Joseph Aero Club and the St. Joseph Air Service have been active.

THE National Aircraft Welding School, Kansas City, has started an airplane engine department under the direction of F. M. Tharp, formerly chief engine inspector on the Cleveland-New York division of N.A.T. The new course includes the tearing down and re-assembling of air-cooled and water-cooled engines.

ST. LOUIS

FOUR runways will be constructed at the St. Louis Municipal Airport, St. Louis, Mo., as part of a three-year development program recently adopted by the St. Louis airport commission. The runways will consist of a mixture of asphalt, earth and crushed rock, a material used in the construction of an experimental runway last summer which was built to test the durability of this mixture. This material is comprised of ten parts of asphalt, about ninety parts of earth and a small amount of crushed rock added to keep the earth from lumping.

A TOTAL of 567,270 miles was flown in 1929 by students enrolled in the St. Louis-Universal Aviation School at St. Louis, Mo., according to a recent announcement of officials of the Universal Aviation Corporation. A total of 6,303 hours were flown by students in training planes during this period.

The school has been approved by the Department of Commerce to give flying and ground school courses leading to private, limited commercial and transport pilots' licenses. During a ten-months period in 1929 the school graduated 95 flight students and 300 ground students.

[A. W. LEAGUE]

A NEW air service, providing round-trips between St. Louis and Wichita, Kansas, through Kansas City, has been inaugurated by T.A.T.-Maddux Lines. The service is given in addition to the regular schedule between St. Louis and Kansas City. Trimotored Fords are used on the run. The plane leaves St. Louis at 9 a. m., arrives at Kansas City at 11:30 a.m. and at Wichita at 1:40 p.m. On the return trip it leaves Wichita at 2:50 p. m., arrives at Kansas City at 4:30 p.m., leaves Kansas City 4:45 p.m. and arrives in St. Louis at 6:47 p.m.

E. A. SALADIN, St. Louis business man, has entered St. Louis aviation by accepting the agency in St. Louis and surrounding territory for the products of the Nicholas-Beazley Airplane Company, Inc., of Marshall, Mo. Mr. Saladin became interested in aviation years ago and is one of the charter members of the St. Louis Aeronautical Association. His sales for the first week included three Barling monoplanes.

THE first evening classes for advanced aircraft engine mechanics has been started at the St. Louis Universal Flying

(*Continued on next page*)

Strange How We All Ultimately Return to the Things That Serve Us Best!

BY

E. B. GALLAHER

Treasurer of Clover Mfg. Company

Editor, Clover Business Service

The Jazz Age we have just passed through brought with it a number of grinding compounds claimed to be "world beaters." They lasted until the Government adopted standard specifications based on actual work value instead of on bluff. They were then ruled out—because a grease-mixed compound cut $3\frac{7}{10}$ times faster than all others, and did a better job.

Then Commander Byrd and Captain Wilkins took only Clover Grease-Mixed Grinding Compound with them on their South Polar Expedition—as they had previously done when they went to the North Pole.

Not so inspiring, possibly, but just as important is the conditioning of airplanes at home. In this connection the following letter speaks for itself:

> *"We have been using Clover Valve Lapping Compound for lapping the valves on some 1500 Liberty-12 Aircraft Engines which we have reconditioned for the U. S. Army Aircorps in the past and we are now working on an order of 1300 of these engines.*
>
> *I believe it is one of the most difficult valve jobs on engines of this type, as the valve must be tight when subjected to an air pressure of 50 to 75 pounds. The valve is about 2 3-4 inches in diameter with a stem of only 7-16 inch diameter. The cylinder seat is steel as is the valve and great care must be exercised to keep the valve and seat from gaulding when finishing the valve by polishing. At one time I tried some ten different kinds of materials for valve lapping but found Clover grades 'E' and 'A' to do the best job.*
>
> *Very truly yours,*
>
> *THE STEEL PRODUCTS ENGINEERING CO.*
>
> (Signed) *J. R. Strong, Motor Dept."*

You might as well have the best — costs no more to buy, and nothing to try.

E. B. GALLAHER:
Clover Mfg. Co., Norwalk, Conn.
You may send me, without obligation:

☐ Sample Clover **Grease-Mixed** Grinding Compound—the kind the Government is buying.
☐ Clover **Water-Mixed** Valve-Grinding Compound. In its class, there's nothing better.
☐ **Green-Stripe** Sandpaper.
☐ **Red-Stripe** Turkish Emery Cloth—for polishing.
☐ **Yellow-Stripe** Aluminous Oxide Cloth—for cutting hard metals. The universal shop abrasive.

Name

Address

Character of business

1930 Model Moth, the first Moth plane completed in the new quarters of the company at the Curtiss-Robertson factory, St. Louis

(Missouri news continued)

School. The course is open to primary mechanic school graduates and will include instruction in the use of precision instruments cylinder reboring and lathe work.

MAJOR RUSSELL YOUNG has resigned as commanding officer of the 35th Division Air Service stationed at the St. Louis Municipal Airport. Major Young is chief test pilot for the Ryan Aircraft Corporation and his duties at the Ryan company would not permit him to devote as much time to the squadron as that required of the commanding officer. Capt. John P. Sparks has been named the successor of Major Young.

ASSEMBLY of the first 1930 Moth plane was recently completed at the Curtiss-Robertson plant, division of the Curtiss-Wright Corporation, at St. Louis, Mo., according to a recent announcement of officials of the Curtiss-Wright Corporation. The 1930 model of the Moth airplane is equipped with an improved type landing gear, new model gasoline tank and gauges, and has an improved fuselage.

KANSAS CITY

[H. H. JAMES]

THE PORTERFIELD AVIATION Interests, Inc., holding corporation of American Eagle Aircraft Corp., has purchased the flying field of the Pittsburg Airport Company, at Pittsburg, Kansas. A new hangar, large enough to handle five planes, will be erected at once.

SEVERAL tests as to the use of Neon lights in the lighting and marking of airports are being made at the Kansas City Municipal Airport. A powerful Neon beacon is being tested out along with red L-shaped lights to mark the corners of runways and green lights to mark runway approaches. White Neon lights mark the runway outlines.

THE AUTO TRUCK COMPANY has taken the distributorship for the Kari-Keen monoplane at Kansas City. The company is planning a sales campaign with Lyle Figland as pilot of the demonstration plane and Joe Hocker, salesman.

[R. BURTT]

THE BREDOUW-HILLIARD AEROMOTIVE Corporation, which specializes in engine overhaul and service work at the Kansas City Municipal Airport, has been rushed with business during the past months. This company has the Wright Aeronautical service contract for the Kansas City territory. At one time during the month of February there were twelve aviation motors in the firm's shop undergoing complete overhauls at one time.

A LARGE amount of activity was carried on at Kansas City Municipal Airport during the month of February. In view of the fact that flying during most of the month was handicapped by the worst snowfall for fourteen years, much credit is due to the capable municipal manager, Roy C. Darrell, who kept the runways open at all times. At no time was the field in such shape that landings and take-offs could not be undertaken. To avoid slippery, frozen runways harrows were used to roughen the surface.

At the present time there are twenty-four daily scheduled arrivals and departures of air mail and passenger transport planes at the Municipal Airport. During the month of February there were 1,259 passengers who landed or took off from the field. Due to the activity on the airport special rules have been made regarding student flying. Student flying is permitted only between daylight and 8.00 a. m., 9.45 and 11.00 a. m., and 4.45 and 7.00 p. m.

The complete facilities of the passenger station at the airport are now available to the public. The building was designed by Edward Tanner, architect of the organization of J. C. Nichols. The building is so laid out that additions may be made without destroying the organization of the plan or appearance.

THE Porterfield Flying School at Fairfax Airport, Kansas City, was erroneously reported in the March, 1930, issue of AERO DIGEST to have been acquired from the Universal Aviation Corporation by E. E. Porterfield, Jr. The name of the school has, instead, been changed to "Universal Aviation School of Kansas City" and the former name is being used for a new organization at Fairfax Airport. The present Kansas City Universal Flying school was acquired by the Universal organization on June 1, 1929, and was approved by the Department of Commerce on October 3. It has been in operation since 1925.

OKLAHOMA

THE sum of approximately $200,000 will be expended during 1930 by Curtiss-Wright Flying Service of Oklahoma for improvements of the company's airport at Oklahoma City, according to a recent announcement of B. C. Graham, local manager of the flying service which operates the field. Mr. Graham was formerly president of Graham Flying Service. In May, 1929, he sold his organization to the Curtiss-Wright Flying Service and was appointed by that company as manager of the Curtiss-Wright base at Oklahoma City.

Phillips Petroleum to Supply Gas for Universal Aviation Corporation

A CONTRACT to use exclusively gasoline produced by the Phillips Petroleum Company has been signed by the Universal Aviation Corporation, a subsidiary of the Aviation Corporation, according to a recent announcement of officials of the Phillips company. The gasoline will be used in the operation of mail and passenger planes of American Airways, Inc., of which the Universal corporation is a division.

The contract includes a minimum daily delivery of 5,000 gallons of Phillips "77" aviation gasoline to airports on the Universal routes including fields at Cleveland, Akron, Chicago, Kansas City, Evansville, Omaha, Indianapolis, Terre Haute, Peoria, Springfield, Louisville, and Dayton. The Phillips firm will install equipment for servicing planes at all airports of the Universal system.

TEXAS

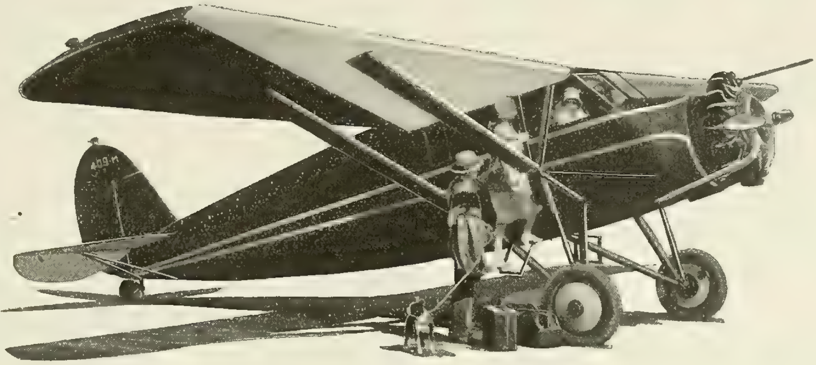
A LATIN American aviation department in which instruction is given in Spanish has been inaugurated by the Southern Airways Schools of San Antonio, Texas, under the supervision of Col. Santiago Philemore, formerly of the Chilean army. Col. Philemore plans to establish a Pan American chapter of the National Aeronautic Association. Headquarters of this chapter will be maintained at San Antonio, and membership will be open to Latin Americans in the United States and to those in Mexico, Central and South America.

Several Latin American instructors have been engaged by the school to give instruction, and twenty-five Spanish speaking students have enrolled in the course.

AIR SERVICES, INC., has been organized at Waco, Texas, with an initial capital of $125,000 to operate in aircraft sales. It has been appointed distributor for the Nicholas-Beazley Airplane Company of Marshall, Mo. Air Services has ordered twenty-two Barling NB-3 planes from the Nicholas-Beazley company and has purchased and started the development of an

(Continued on next page)

STINSON



Announcing
210 H. P. 4 Place Cabin Plane
$5775

Widespread private ownership and use of airplanes for transportation dates from the introduction of this new Stinson.

It is to be expected that Stinson, having been first in so many ways, would also lead by introducing the first 4-passenger cabin ship in the $11,000 class for $5775.

This plane definitely and exclusively establishes a totally new standard of value.

Its new price was not justified by present volume. It was based upon the belief that when the public learned how safe, comfortable and easy it is to fly, the demand for this stable, rugged and dependable fly-itself type of ship would quickly justify its price. Already our belief has been vindicated.

Behind the Stinson program is engineering ability, manufacturing resources, financial strength, buying power and experienced management that today enable Stinson to do things impossible heretofore.

Electric starter . . . Adjustable metal propeller . . . Wheel and emergency parking brakes . . . Cabin heaters . . . Hydraulic and spring shock absorbers . . . Rich broadcloth upholstering . . . Shatter proof glass . . . Rubber insulated motor mount . . . Gasoline gauges . . . Flying instruments . . . Dual wheel control . . . Adjustable pilot seats . . . Balloon tire tail wheel . . . Navigation lights . . . Smoking Sets.

* * *

Powered by the rugged Lycoming 9 cylinder, 210 h. p. radial air-cooled motor, the Stinson has a cruising speed of 103 miles per hour, a high speed of 125 miles per hour, and a landing speed of 45 miles per hour. It will climb 600 feet per minute at sea level and will reach a maximum height of 15,000 feet, and with one filling of the gas tanks will fly 500 miles. Gasoline consumption is on the basis of nine miles to the gallon. The Stinson has a wing-spread of 41 feet 8 inches, is 29 feet long and is 8 feet 9 inches high.

Stinson Aircraft Corporation, Wayne, Michigan
Division Cord Corporation

OTHER STINSON PLANES: 4-Pass.—225 H. P. Wright—$8,495 • 4-Pass.—300 H. P. Wright—$10,495
6-Pass.—300 H. P. Wright—$10,995 • 8-Pass.—425 H. P. Wasp—$15,995 • Stinson Airliner—10-Pass.
Tri-Motored Transport, $23,900 • Prices F. O. F. Wayne, Michigan • Equipment other than standard, extra

DEALER franchise still open for right men in some localities

(*Texas news continued*)

airport near Waco which will be used as the company's headquarters and for aircraft demonstration purposes.

THE Curtiss-Wright Flying Service will station a fleet of twenty planes equipped for crop dusting at Houston, Texas, according to a recent announcement of Paul Jackson, manager of the service in Southern Texas. The planes will be under the supervision of E. J. Bond, manager of the crop dusting operations of the Curtiss-Wright Flying Service, and will be operated to protect the cotton belt extending through southern Texas and Mississippi.

CONTRACTS for engineering services on three airport projects in Texas and Louisiana have been signed by the Airports Engineering and Construction Corporation, a unit of the Southern Air Transport division of the Aviation Corporation. The projects are planned at Shreveport and Natchitoches, Louisiana, and Texarkana, Texas.

Shreveport has purchased the site and named that company engineers for a $300,000 municipally owned port. Plans include an administration building, complete lighting system, 75,000 square feet of concrete in aprons and walks and a hangar one hundred by eighty feet and a machine shop forty by eighty feet. Grading the field and the construction of runways will also be a part of the job. The completed field will be a Class A1A port.

Natchitoches, La., will spend $15,000 in the installation of boundary lights and a metal hangar, engineered by the Airport Engineering and Construction Corporation. In Texarkana the company is engineering the conditioning of the field, construction of a hangar and administration building and installation of lighting system. The project is to cost about $75,000.

HENRY FRESE has been appointed sales representative for the Lockheed Aircraft Corporation of Burbank, Calif., a division of the Detroit Aircraft Corporation. Mr. Frese will establish headquarters at Fort Worth, Texas.

[C. MORRIS]

THE Cromwell airlines daily departure schedule from San Antonio to San Angelo has been changed in order that planes may connect with the T. A. T. plane which arrives from Brownsville each afternoon. The new schedule provides that a plane leave Winburn Field, San Antonio, at 4 p.m., according to a statement made by D. D. Myers, traffic manager of the company.

A NEW schedule between San Antonio and Houston, Texas, recently inaugurated by Southern Air Transport, makes possible a sixteen-hour trip from Corpus Christi to New Orleans. A plane leaves Corpus Christi at 2:35 p.m., arriving at San Antonio for the 4 o'clock plane to Houston, which connects with rail to New Orleans arriving there at 6:30 in the morning.

THE total value of Midland airport, when completed, is estimated at $50,000 by H. M. Beecher, airport manager. The airport is being built with the coöperation of W. H. Sloan of Midland and the United States Government.

A $6,000 Government building, housing meteorological and radio rooms and barracks, is nearing completion. Work is soon to be started on the $15,000 administration building to be constructed. A $10,000 government hangar and an $18,000 municipal hangar will also be erected. Other improvements will include beacon, observation, and boundary lights.

THE Curtiss-Wright Flying Service has designated Houston as the national insect control headquarters of the organization, it was announced by Paul Jackson, Houston manager. The fleet of twenty-two dusting planes being assembled in that city will operate from coast to coast and into Mexico. The first operation of this year will begin May 1 to fill a contract for dusting citrus fruit in Florida. Cotton dusting operations will begin about June 1 in the Rio Grande Valley.

The company has moved into its new building at 2406 Louisiana Street. Complete equipment is being installed and work has been started in preparing eight planes for dusting operations.

THE airway from Dallas to San Antonio will be completed and lighted within the next four months in accordance with the plans of the government to operate a lighted airway between Dallas and Brownsville by way of Waco, Austin, and San Antonio. The improvements contemplated by the Department include the erection of twenty-four beacons along the Dallas-San Antonio line, each throwing out a beam of 2,000,000 candlepower; the establishment of emergency landing fields at Belton, Georgetown, San Marcos, and Randolph Field, south of New Braunfels; and the installation of radio beacons at San Antonio and Waco, each beam from which will be one hundred miles in length. The emergency landing fields will be lighted by the Government with boundary lights, course, and obstruction markers.

SAN ANTONIO

[M. C. COOPER]

WORK at the world's largest flying school, Randolph Field, assumes national significance as plans progress for the dedication to take place June 25, 1930. Invitations have been extended to President Hoover and members of his cabinet and various officials have tentatively expressed their intentions of participating in the celebration. Patrick J. Hurley, Secretary of War, F. Trubee Davison, Assistant Secretary of War, and Maj. Gen James E. Fechet will take part on the program.

Squadrons from every branch of the Air Corps from various Army air fields throughout the country will attend the ceremonies, and invitations will be extended to military and commercial aviation centers here and abroad.

The exercises will be conducted under the auspices of the aviation committee, San Antonio Chamber of Commerce, San Antonio Chapter, National Aeronautic Association, and the Junior Chamber of Commerce. The Army Air Corps will coöperate to render the event brilliant and memorable, though its participation will be unofficial.

NINETY-FIVE pilots were graduated from Kelly Field, Texas, on February 27th. Brig. Gen. Halstead Dorey made the graduation address and presented the diplomas. Flying review in formation was prevented by cloudy weather and a low ceiling. Of the ninety-five graduates, twenty-four were sent on foreign duty, nineteen reporting to Hawaii and five to Panama. On March 3rd, ninety-six new students including forty-eight from March Field and forty-eight from Brooks Field entered Kelly Field and began instruction on March 10.

AN international passenger service by airplane has been inaugurated between San Antonio and Mexico City, via Eagle Pass, San Luis Potosi, and Torreon. Maintaining a tri-weekly service, the Transportes Aeros Transcontinentales, of which Eduardo Meade is president, operates six-passenger Bellanca planes, making daylight flights between the Mexican capitol and San Antonio on Tuesdays, Thursdays, and Saturdays. Eagle Pass has been designated as a temporary airport of entry and the company has concession from the Mexican government to carry mail between Piedras Negras and Mexico City.

A daily passenger service between San Antonio and Monterey, Mexico, via Laredo, will be inaugurated. The line is financed by Monterey business men and the Laredo Chamber of Commerce. A fleet of six-passenger planes have been ordered for the line which will connect at Monterey with airlines to Tampico, Mazalan and Mexico City, via Torreon.

TENNESSEE

PLANS have been completed for the erection of an airway radio station at Sky Harbor, Nashville, Tenn., according to a recent announcement of officials of Interstate Airlines, Inc., operator of the field. The beacon will be installed in preparation for the inauguration of night air mail service by the Interstate company between Chicago, Ill., and Atlanta, Ga.

Interstate Airlines operates an air transport day service between Atlanta, Chicago, Evansville, Ind., and St. Louis, Mo. The Simplex system of communication has been installed along the routes established by the company and the organization plans to install a radio system of communication in addition. All terminals along the routes have been equipped with lights for the inauguration of night service scheduled by the Interstate company, with the exception of the airport at Chattanooga, Tenn.

Sky Harbor is located twenty-three miles

(*Continued on next page*)

ANNOUNCEMENT

A New Price
A Real Time Payment Plan

WHITTELSEY AVIAN $3,845

Down Payment about $1,358

Balance monthly payments

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$450 extra

All Prices F.O.B. Bridgeport, Conn.

In the short space of one year since its arrival in America, the famous Avian has been accepted by the great part of the American public as representing the maximum of safety in the air.

At the International Aircraft Show, Feb. 15th to 23rd, in Saint Louis, the Whittelsey Manufacturing Company presented the 1930 Avian with all its well well known safety features plus a refinement of detail and quality of equipment well in advance of common practice.

And we announce at this time a reduction in price, based on quantity manufacture, coupled with a time payment plan which immediately makes the ownership of an Avian a highly practical investment for business or sport.

Here is downright safe performance that no other light plane can equal. And economy that can't be beaten—the Avian makes every gallon of gas give 20 miles of travel. *You can now buy an Avian for about* $1358.00 *down and balance in monthly payments.* Write today for full information on the plane that's built for sport, safety and economy.

To Dealers and Distributors

When you fly or sell the Whittelsey Avian you have something to talk about. No other light plane has such a record of performance . . . or the equipment. Dealers and distributors are still being appointed. Write for our sales plan, and for full data and specifications of the plane itself. The Whittelsey Manufacturing Company, 220 Howard Avenue, Bridgeport, Conn.

IN AMERICA
WHITTELSEY AVIAN
AVRO AVIAN
IN ENGLAND

WHITTELSEY AVIAN

THE OUTSTANDING SPORT AND TRAINING PLANE OF THE WORLD

(*Tennessee news continued*)

southeast of Nashville. The airport is equipped with a clubhouse, a large hangar and comprises an area 188 acres in extent. Interstate Airlines, operators of the field, operate a flying school at the airport.

ALABAMA

A NEW world's parachute jump record of 11,000 feet was established on March 2 by Jack Dare who jumped from a plane at an altitude of 15,000 feet over Messer Field, Birmingham, Ala., and opened his 'chute when 4,000 feet above the field. The jump was witnessed by members of the National Aeronautic Association. Dare is affiliated with the Red Wing Flying Service of which Roy Ahearn is chief pilot.

[O. G. JONES]

BIRMINGHAM is to have a new municipal airport, according to the results of a recent municipal vote in which one million dollars in bonds has been set aside by the city. The people of Birmingham decided overwhelmingly in favor of the bonds.

The site, upon which the airport will be built, is located in the eastern section of the city, near the business district. It is a tract consisting of about 300 acres, the largest tract of land available in the Birmingham territory. Mountains surrounding the city prohibited the selection of a larger site.

Work will start in the near future on the construction of the field. The land will be made ready for the use of planes, and an administration building will be erected later. In this administration building will be quarters for the weather department, a lounge for pilots, a waiting room, and other conveniences. A large hangar will also be erected by the city and several commercial companies have announced plans for similar structures.

Because the city has the new airport the southern transcontinental air mail line will pass through the city. The present mail line running through Birmingham en route to Atlanta and New Orleans will, however, be changed from Birmingham to Montgomery.

AT a recent election of officers of the Birmingham chapter of the National Aeronautical Association, Hub Hahn was elected president. J. H. Willis, was chosen first vice president; R. Burt Orndorff, second vice president, and E. W. Stanford, secretary and treasurer.

PLANS are announced for a municipal election to be called at Mobile to decide on a bond issue for improvements on Bates Field, the Mobile municipal airport. The issue will be for about $50,000, according to Mayor Cecil Bates, and the money will be used for enlarging and improving the field.

GEORGE TATE was recently elected president of the Selma Aviation Club at Selma, Ala. Other officers elected were: Huston Armstrong, vice president, and Barnwell Reynolds, secretary and treasurer. The club has a membership of fifteen.

FLORIDA

[J. WRIGHT]

THE Municipal airport at Vero Beach, Fla., was dedicated the "Vero Beach-Silvertown Airport" on March 5th. James Tew, president of the B. F. Goodrich Rubber Company, delivered the dedicatory address. The Curtiss-Wright Exhibition Company team and the Goodyear blimp *Defender* from Miami were the principal features of the celebration. Among the winners of prizes for the various events scheduled were Dale "Red" Jackson, Freddy Lund, Jack Wilson, Frank Snyder, Robert Toomey, A. B. McMullen and E. B. Smith.

A NON-STOP flight from Detroit to Miami in 10 hours and 15 minutes was made on March 9th by Walter E. Lees and Capt. L. M. Woolson in a Stinson Detroiter monoplane powered with a Packard Diesel engine. The total cost of the fuel used on the non-stop flight was reported as $8.50.

THE increase in air travel between Miami and foreign countries is reflected in the records of arrivals from foreign countries made available by the United States customs office at Miami. In January 1928, nineteen airplanes arrived with eleven passengers. The same month in 1929 showed that ninety-nine airplanes arrived with a total of 402 passengers. The increase in arrivals of both the number of planes and passengers continued at a substantial rate, and in last January 750 passengers arrived in 181 airplanes.

FRED J. SCHWAEMMIE, operations manager for Eastern Air Transport Inc., at Miami, has been transferred to Atlanta and Elmer G. Cross transferred from a similar position at Tampa to Miami. George R. Cushing has been promoted to fill the vacancy left by Mr. Cross at Tampa.

PI OMICRON, aviation fraternity of the University of Miami, recently joined with the Intercollegiate Aeronautic Association, according to an announcement of Francis Houghtaling, president of the fraternity. Members of the club recently flew in the Goodyear blimp *Defender* in the first of a series of aerial investigations which the club will sponsor for the purpose of studying the adaptability of terrain in South Florida for glider flying.

NEGOTIATIONS for the purpose of leasing Dinner Key, former Naval base near Miami, Fla., as a seaplane base were recently started by officials of the City of Miami with the Pan American Airways, Inc., and the New York, Rio and Buenos Aires Lines. Under a tentative agreement drawn up by the city officials, each company would have an option of leasing forty per cent of the waterfront property on the east and northeast side of the key which has been filled in. The city would reserve twenty per cent of the land in the center of the key and the south side for the use of private planes.

THE CURTISS WRIGHT EXHIBITION COMPANY assembled its team of fliers at Miami early in February where they went through several weeks of training preparatory to starting a nation-wide tour. The team includes Dale "Red" Jackson, J. Leroy McGrady, Margaret Thomas, Freddie Lund and Swanee Taylor. Capt. H. D. Norris is manager. The flying equipment of this organization includes three Travel Air Speedwings, the Curtiss Tanager and the Travel Air Mystery Ship. Immediately after completion of their training the organization gave exhibitions in Miami, Vero Beach and Tampa.

[J. M. MURRAY]

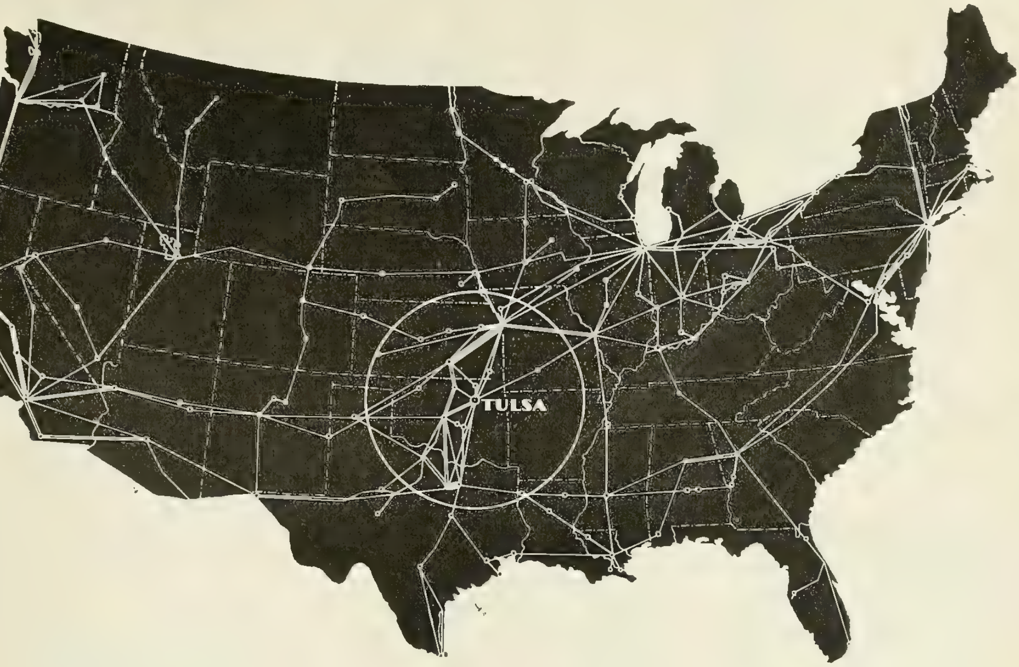
THE city of Daytona Beach on March 1 completed arrangements to acquire an airport with the purchase of two hundred acres of land, less than three miles from the center of the city. The new port is to supplant the field now used by mail planes. Work has already started to prepare the field for use as the junction of the night air mail lines flying down the East Coast and to Tampa. It will be lighted according to Government regulations and put in shape for the use of the mail planes when the night service opens to Miami.

The new port site fronts approximately three-quarters of a mile on the Daytona-DeLand road and is about one mile east of one of the Government night mail beacons on the Jacksonville-Miami air mail line. Boundary and obstruction lights and a field beacon in addition to the ground improvements will put the field in condition for air mail use.

CONSTRUCTION is under way on the new airport and landing field at Dunedin, Fla. A steel hangar which provides for five planes is already completed. Two runways are being constructed, one running northwest and southeast 1,200 feet long, and the other extending at right angles has a length of 1,000 feet. Both are to be paved. The airport, located on the bay front, will also provide facilities for seaplanes. A well equipped machine shop is being installed and a mechanic will be on duty seven days a week to render service to visiting planes.

REPORTS of the Jacksonville Chamber of Commerce aviation committee incorporating recommendations for improvements to the Jacksonville Municipal Airport were accepted at a recent meeting. Recommendations contained in the reports call for expenditure of $18,585 for improvement in the lighting system, installation of a radio receiving set, improvements to the water system, and other changes necessary to round out the facilities at the port. The balance of $4,415 of the $23,000 fund made available for this work will be held in reserve.

A MODERN airfield is to be developed at Fort Pierce, Fla., with the purchase of a 167-acre tract of land from the city by Capt. F. M. Upton. The tract is located but two and a half miles from the center of town.



The World's *Primary* Air Center

Tulsa would appear to be a "City of Destiny." One of the youngest cities in the nation—a mere village in 1905—suddenly OIL became a major factor in world progress, and Tulsa, almost overnight, found herself the center of the world's petroleum resources, internationally recognized as "The World's Oil Capital," and one of the wealthiest and fastest growing cities in the world.

Now another great innovation—Aviation—has captured the world's interest, and again, almost overnight, Tulsa awakes to find herself the world's primary center of *air transportation,* as a result of her location at the natural crossroads of transcontinental East-West and North-South air travel in North America.

Since June, 1929, the Tulsa Municipal Airport has been, by actual monthly arrival and departure figures, the busiest airport in America. Early in the present year, statistics began to show it to be the busiest airport in the *world*. In February combined arrivals and departures of paid air passengers at the three leading European airports, Croydon, London, Le Bourget, Paris, and Tempelhof, Berlin, totalled 3,866. Figures for Tulsa alone totalled 7,373, or nearly double the three European ports combined. This figure breaks all previous records for any airport in a single month.

Some of the world's largest oil fortunes are behind the great air transportation systems and aviation enterprises which now center at Tulsa.

The Spartan Airplane, manufactured at Tulsa, is one of the world's finest-built airships and was the first small plane to be advertised in such national media as the Saturday Evening Post. Tulsa is the only city in the nation having more than one aviation school carrying Department of Commerce approval as both ground and flying school.

For complete information about Tulsa's aeronautical activities address the Tulsa Chamber of Commerce.

TULSA

Final Report on the Guggenheim International Aircraft Competition

THE final report of the Daniel Guggenheim International Safe Aircraft Competition has been prepared by the Daniel Guggenheim Fund for the Promotion of Aeronautics, Inc., of New York. The book describes the purposes of the competition, lists the personnel in charge of the events and contains the complete results of the competition. A technical description of each of the planes which competed is given in addition to an explanation of their failure to qualify. The Curtiss Tanager which won the competition is fully described.

The methods of conducting the competition and the instruments used to obtain the results are described in detail. The text is illustrated with photographs and drawings of the planes entering the competition, the instruments used, the field where the events were held, and graphs of performances made during the trials and final events.

Military Aircraft Production of the Curtiss Aeroplane and Motor Company

"CURTISS Military Aircraft," an elaborate booklet printed in four languages, English, Spanish, French and German, and presenting the history and description of airplanes and engines designed and constructed by the Curtiss Aeroplane and Motor Company for military use since 1909, has been prepared by the Curtiss-Wright Export Corporation. The text includes the story of the Curtiss organization since its inception, and a discussion of the policy and aims of the company. The planes described are the Fledgling, Falcon, Hawk, and Condor.

The cover design is done in black, gold, red and blue and represents a Curtiss Condor in flight. The frontispiece is a photograph of three Curtiss military planes flying in Vee formation. Each left-hand page is utilized for the reproduction of photographs of Curtiss factories, flying fields and the ships described in the text. The specifications of each plane are listed under its illustration.

The text includes a general description of the planes, plants and fields of the company pictured in the accompanying illustrations.

Pyle-National Company Catalog 210-8

THE Pyle-National Company of Chicago, Ill., recently published a forty-eight-page catalog No. 210-B entitled, "Airport and Aircraft Lighting Equipment." The booklet describes aircraft equipment manufactured by the company, including landing lights, navigation lights, luminous-tipped switches for aircraft, and the prismatic lens type of built-in landing light recently developed by the company. In addition to the aircraft equipment produced by the Pyle-National Company, the catalog describes the airport lighting equipment manufactured and distributed by the company.

A feature of Catalog 210-B which is of particular interest at the present time is a complete wiring diagram for airplane lighting installations. Arrangement of landing and navigation light wiring, switches, instrument board lights, connectors and other details is clearly shown.

TRADE LITERATURE

NEW PAMPHLETS AND BOOKS OF INTEREST TO THE AERONAUTICAL INDUSTRY

Detroit Aircraft Corporation Publishes Booklets Descriptive of its Products

DESCRIPTIONS and illustrations of aircraft manufactured by the subsidiary companies of the Detroit Aircraft Corporation are contained in a pamphlet which has been published by the Detroit Corporation. The planes described are produced by the Ryan Aircraft Corporation, Eastman Aircraft Corporation, Lockheed Aircraft Corporation, Parks Aircraft Corporation, Gliders, Inc., and Blackburn Aircraft Corporation. The pamphlet lists the rated performance and specifications of each plane and contains a brief description of each. A photograph and description of Parks Air College is given, in addition to Grosse Ile Airport, the ZMC-2, all-metal dirigible constructed for the Navy Department by the Aircraft Development Division, and an automatic riveting machine designed by the Aviation Parts Division of Detroit Aircraft.

Further matter descriptive of planes produced by the organization are as follows:

Ryan Models to be Produced During 1930

A BOOKLET, "New Ryans for 1930," has been prepared by the Ryan Aircraft Corporation, a division of the Detroit Aircraft Corporation. The pamphlet contains descriptions and illustrations of the Ryan Foursome, Ryan Brougham, and Ryan Wasp Brougham, and gives the specifications and performance of each type. Several pages are devoted to a discussion of the use of airplanes by business executives. The two center pages are utilized by a double-spread under the caption, "The Sun Never Sets on Ryan Aircraft," with photographs of Ryan planes in use in foreign countries.

"Lockheed"—Vega, Sirius and Air Express

"LOCKHEED," a pamphlet describing the aircraft products of the Lockheed Aircraft Corporation, division of the Detroit Aircraft Corporation, was recently prepared by the Lockheed company. The cover is done in silver, black, red and blue, and illustrations of Lockheed planes in the field contained in the booklet are reproduced in color. The booklet contains photo graphs and drawings of Lockheed planes, a chart and data on the operating costs, and specifications of each type. The models described in the booklet are the Lockheed Vega, Lockheed Sirius, and Lockheed Air Express.

Facts About the Eastman Flying Yacht

A BOOKLET describing the Eastman Flying Yacht has been prepared by Eastman Aircraft Corporation, subsidiary of the Detroit Aircraft Corporation. The text is written in non-technical language describing the uses and performance of the Eastman Flying Yacht, and is illustrated with photographs of the ship in the field. The booklet contains a description of the Eastman Flying Yacht, giving its performance.

Richfield Surveys California Airports

THE Richfield Oil Company recently published the first section of a booklet entitled, "California Airports and Intermediate Landing Fields," which includes detailed data on all of the regularly maintained airports and intermediate landing fields in California, numbering over 150. The booklet which is of the loose-leaf type, was prepared by George S. Woodward of the service division of the aviation department of the Richfield company.

This publication contains, in addition to information on the airports, sunshine tables for every day of the year in California; air traffic rules of the Department of Commerce; air traffic regulations recently enacted by the State of California; aircraft engine lubricating charts; and forms for aircraft inspection and engine overhauls.

Properties of Haynes Stellite," 3rd Edition

IN the most recent edition of "Properties of Haynes Stellite,' published by the Haynes Stellite Company of Kokomo, Ind., information on the company's products is included which has not appeared in previous editions, and the booklet has been revised and brought up to date. The booklet contains a general description of Haynes Stellite alloys and an explanation of the uses, structure, and physical and chemical properties of these alloys.

Development of Love Field, Dallas, Tex.

A PAMPHLET, "Clinching Leadership in a Great New Transportation Field," has been published by the Dallas Airports Utilities Corporation, sponsored by the chamber of commerce of Dallas, Texas. The booklet describes the establishment of Love Field at Dallas and its development into a first class field, and contains photographs of the airport and a list of the directors of the Utilities corporation.

History and Construction of Laird Planes

SPECIFICATIONS, photographs and descriptions of Laird aircraft are contained in "Laird," a booklet recently published by the E. M. Laird Airplane Company of Chicago, Ill. The pamphlet narrates the career of E. M. Laird, founder of the company, and describes the first plane built by Mr. Laird, in addition to a history of the company's organization and policies. The aircraft described are the Laird Whirlwind and Laird Speedwing. The booklet contains photographs of Laird planes in the process of construction in the company's plant, Laird planes in the field, and lists the uses for which the ships have been designed.

Planes of the Spartan Aircraft Co.

"SPARTAN," a pamphlet describing aircraft produced by the Spartan Aircraft Company of Tulsa, Okla., was recently prepared for distribution to the aeronautical industry by the Spartan company. This booklet contains illustrations, specifications. and descriptions of the Spartan C-3-166 and the Spartan C-3-225. Descriptions are included of the Comet aircraft engine and the Wright Whirlwind which power the Spartan models.

MODELS

WHEN

the Wrights Were Young . . .

Others, too, were pioneering. A. F. Selley was building and flying prize-winning model airplanes. Medal after medal rewarded his expert skill. Now today, he is still developing models that fly, that are realistic, that are easy to build. These expertly designed models come semi-built in construction sets, complete with full-size detailed plans and step-by-step directions.

Fly? Of course. Send for yours today. Your money back if you are not satisfied. Postpaid,

Curtiss Ace	$4.25
Bellanca Columbia	6.75
Spirit of St. Louis	7.25
Junkers Bremen	6.25
Stinson Detroiter	7.75

Add 15c West of Mississippi

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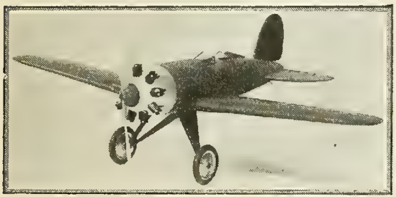

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LE BOURGET FIELD RULES

(Continued from page 142)

electrician is simply the one who obeys the orders.

The officer shall telephone to the air squadrons concerned before each flight whether any commercial planes are expected at the airport. In this latter case, a representative of the administration of the airport shall be present alongside of the electrician, and shall give him all the necessary instructions for the maneuvering of the signals and lighting the projectors.

When the military flights are terminated, the officer shall inform the electrician of this fact.

RULES IN CASE OF FOG

At the Airport of Bourget-Dugny at a time of fog (i.e., each time that the horizontal visibility is below 1,000 meters (3,281 feet) or that the vertical visibility is lower than 100 meters (or 328 feet) the take-offs are made according to the following rules:

1. Right of way is given to a plane equipped with wireless, which acts as a guide. If this plane cannot continue its trip, it must, within twenty minutes from the time of its departure, report by wireless to the Airport of Bourget-Dugny its decision to return.

2. If there is no plane equipped with wireless, the take-off is given to a guide plane without wireless, and the latter should be back at the port within twenty minutes if it does not continue its trip.

3. If after twenty minutes the scout plane has not returned to the port or has not reported its return, the take-off signal is given to other planes following the order established by the Commandant of the airport.

4. When this arrangement exists, the planes which are expected at the airport are notified by wireless. The planes which are not equipped with wireless receivers, are notified that this arrangement exists at the airport by means of large panels bearing the letter "B" painted red on a white circular background.

One of these panels is placed in the area of signalization of the emergency field at Beauvais-Tillie and the other on the emergency field of St. Quentin-Roupy.

TRAFFIC ON THE FIELD

1. Traffic on the landing field is strictly forbidden except in the case of major necessity.

2. All equipment forced to cross the field is provided in the day time with a red flag (obstruction) at least 2 meters (6.5 feet) long and at night with two red lanterns.

4. In case of accidents, the personnel of the company concerned are the only ones to go to the plane and shall take care to march in a group.

4. Vehicular traffic is strictly forbidden. Ambulances of the 34th Regiment and the port are alone authorized on the field in case of accident.

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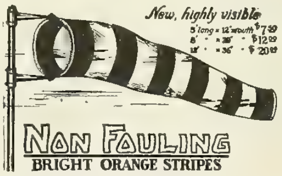

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FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

1930 EUROPEAN LIGHT PLANE TOUR

[PAUL E. LAMARCHE]

THE Challenge de Tourisme Internationale or International Light Plane Tour, which last year created so much interest throughout Europe, will commence in July this year. The present holders of the cup, the Deutscher Luftrat, have requested the Aero Club of Germany to draw up the regulations for the organization of this year's contest. The rules for the competition for 1930 will be practically the same as those of last year, although some modifications will be made. The definite rulings will be published after approval by the Federation Aéronautique Internationale.

The Sport Commission of the German Aero Club has elaborated the regulations for the 1930 competition and has presented them to the Collège des Commissaires Sportifs du Challenge 1929 at a meeting in Berlin. This program which will be presented to the F. A. I. in Paris has but few differences from that of last year.

The technical tests which last year preceded the tour of Europe at Orly Field, near Paris, will not take place until after the tour this year. This will, in all probability, mean fewer competitors and will simplify some of the difficulties of the technical organization. Only airplanes that have finished the circuit will be eligible for the technical tests and the results will be determined by an award of points.

The conditions for the empty weight of the two categories of light planes have not been modified and remain at 400 kilograms (880 pounds) for the first and 280 kilograms (616 pounds) for the second, with an allowance of ten per cent on both weights.

Competitors will not be allowed to start on the European circuit until they complete a tour of 200 kilometers (136 miles) before landing at the airport where the start will be made. Airplanes that come by air to the starting point from distances of 200 kilometers will not be required to make this preliminary trip.

In last year's contest the award of points totaled 165, and if the awarding of points in this year's contest follows the same plan, they will be awarded as follows:

Regularity and speed on European circuit	90 points
Practical qualities of the plane	45 points
Tests for take-off and landing	20 points
Tests for fuel consumption	10 points

Regularity will be given an award of twenty-five points in place of the thirty-five points given in the 1929 contest. The awarding of points for speed is modified in that the points awarded to the places obtained in each of the two categories are cancelled. The awarding of points for speed will be governed by a schedule based on speeds of from seventy-five to eighty kilometers (forty-six to forty-nine miles) per hour for the first category and sixty-five to seventy-five kilometers (forty to forty-six miles) per hour for the second light plane category. The limits fixed at 128 and 143 kilometers (seventy-nine and eighty-eight miles) per hour respectively in 1929 are increased from twenty to twenty-five kilometers (twelve to fifteen miles), according to the category.

The European circuit will commence in the middle of July and will cover a distance of approximately 7,000 kilometers (4,340 miles). All planes starting must satisfy the conditions imposed by the C. I. N. A., in order to obtain a certificate of navigability.

The awarding of points for the technical tests that will follow the European circuit will be made specifically. Under practical qualities the points for general comfort and arrangement will be given as follows:

Normal comfort	2
Side-by-side seating arrangement	2
Communication set when seats are in tandem	1
Cabin overall equipment	3
Special comfort	2
Third comfortable seat	3
Place for two valises	3

Five points will be awarded for the general qualities of the landing gears. Landing gears without axle or with split axles will count two points, wheel brakes will receive the same award, self starter will give the plane four points to its credit and an award of three points is given for fire-fighting devices. A propellor may be changed in the tour but it must be carried on the plane and for having the extra propellor one point will be awarded. The same award goes to planes being equipped with metal propellor. Two points will be awarded for dual control provided that it is completely assembled. Five points will be awarded for the installation and use of parachutes on condition that they are carried during all of the competition.

It is obligatory for the competing planes to carry the following instruments on board as part of their equipment: Pitot tube, revolutions per minute indicator, compass, altimeter and a watch. The presence of complementary instruments will be given awards up to five points. A bank inclinometer will be given one point and a pitch inclinometer two points. The visibility and arrangement of the instruments will be awarded two points.

A total of eight points will be awarded for the mounting and dismantling qualities of the contesting planes. Award will also be made for the time in mounting and demounting. Planes of metal construction, whether able to be easily demounted or not, will be given an award. Ten points will be reserved for the results of the fuel consumption tests.

A total of twenty points will be awarded to planes in the take-off and landing tests. In these tests the contestants will be obliged to fly over an obstacle eight meters (26 feet) in height. Eight points will be given for take-offs and twelve for landings.

There is no test for altitude or climb, as it is felt that since the European circuit is a course with many natural obstacles, all planes that compete must possess desirable qualities in order to overcome them.

GERMANY

A NEW factory as an addition to its present plant has been purchased by the Ernst Heinkel Flugzeugwerke of Warnemunde, Germany. The new plant is located at Rostock, a city ten miles distant from Warnemunde, and has a floor space of 60,000 square feet.

The Rostock plant of Ernst Heinkel Flügzeugwerke will be used for production, and the design and construction of new experimental types of planes will be carried out at the Warnemunde factory where the main offices of the company will remain.

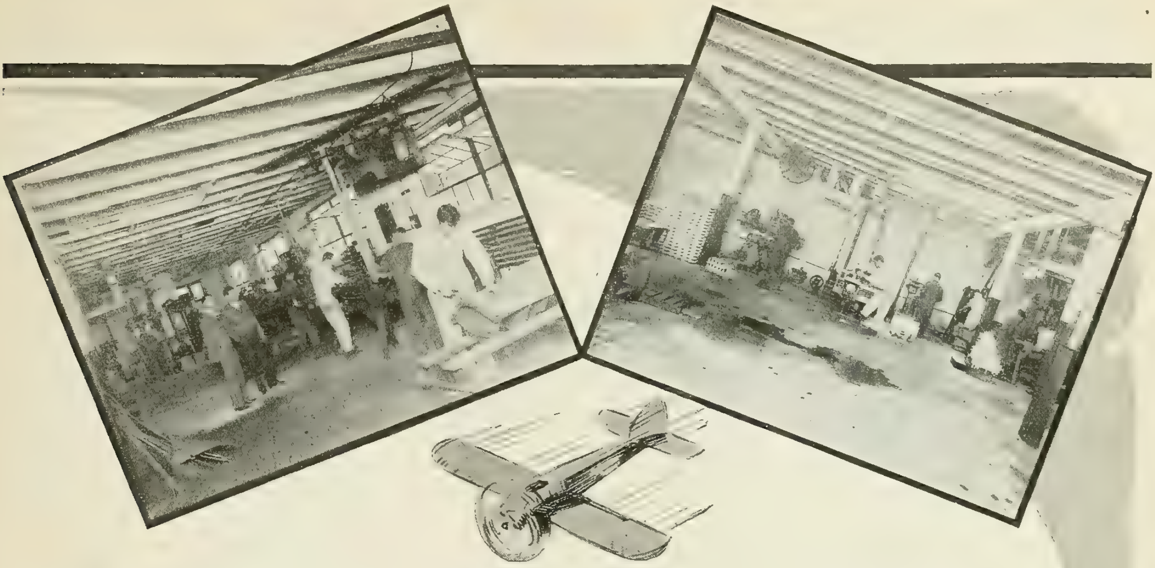
A COURSE in blind flying has been established by the Deutche Luft Hansa at its Berlin-Staaken base. The course will be given to pilots employed by the company as training in night and fog flying by the use of instruments alone. Three planes of different types will be used in the blind flying training. Provision is made for side-by-side seating arrangements, one pilot having an unobstructed view and the other enclosed in a framework of frosted glass or shutters, giving the effect of flying in fog or darkness respectively. The pilot in the enclosed cockpit is provided with illuminated instruments and flys the plane according to instructions given him by the pilot in the open cockpit.

The Deutche Verkehrsflieger Schule, a branch of the German Traffic Pilots' School, has been transferred from the Berlin-Staaken airport to Brunswick where sixty planes are available to 100 students enrolled in the branch. The school is financed chiefly by government subsidy, the sum of 2,000,000 marks having been appropriated by the government during 1929.

ICELAND

THE Icelandic Aviation Company recently announced plans to increase its capital to 200,000 crowns and to augment its fleet of two Junkers all-metal seaplanes with five additional seaplanes of the same type to be purchased from the Junkers Company. The company plans to operate the five additional planes between Reykjavik and the major cities on the island. Fliers and mechanics who will assist in the operation of

(*Continued on next page*)



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Continued from preceding page)

the line have been sent to Germany for instruction by the Junkers Company.

CANADA

New Western Canada Mail Service

[C. P. DETTLOFF]

WESTERN Canada Airways inaugurated on March 3 an air mail service between Winnipeg, Regina, Moose-Jaw, Medicine Hat and Calgary; Vancouver and Calgary; and between Edmonton, North Battleford and Saskatoon. According to the schedule of operation which has been established, a westbound plane leaves Winnipeg at 9 p.m. and arrives at Calgary at 5 a.m., an eastbound plane leaves Calgary at 1:10 a.m., shortly after the arrival of the Winnipeg-Calgary plane; and arrives at Winnipeg shortly before noon.

Six Fokker 14's and three Boeing planes comprise the flying equipment with which the service has been started. These ships are equipped for night flying, including the installation of landing lights under each wing. Included in the flying personnel are Major Thompson, Roy Brown, Hollick Kenyon, W. J. Buchanan, C. Farrell, M. E. Ashton, A. E. Jarvis, D. R. MacLaren, W. N. Cummings, and A. H. Farrington.

Two systems of lighting will be used in night flying west of Winnipeg. From Winnipeg to Regina a series of revolving flash beacons have been installed at points along the route. West of Regina acetylene gas beacons will direct the night fliers.

[J. MONTAGNES]

WITH the new air mail service recently inaugurated between Winnipeg, Calgary and Edmonton, only that territory between the Rocky Mountains and the Pacific Coast, and from Western Ontario to Winnipeg, remains unserved by air mail in Canada. It is anticipated that at least a portion of the latter territory will be linked up during the coming summer. The remaining portions will be covered as soon as the necessary surveys and ground work can be carried out. This will take some time as the equipment of flying fields and the installation of lighting arrangements must be thorough. Air mail routes already in operation in Canada extend from Moncton, New Brunswick, to Windsor, Ontario.

THE fire-fighting staff of the Ontario Department of Lands and Forests during 1929 included eleven district foresters on duty; twelve air bases; twenty-six airplanes, and nineteen radio stations. The Ontario government was the first to use planes on such a large scale for the protection of forests from fire. It has the largest aerial fire-fighting force in the world.

THE Third Annual Montreal Aircraft Exhibition will be held in the Stadium Building, Montreal, Canada, April 19-26. The show will be under the auspices of the Montreal Light Aeroplane Club, Incorporated.

AN airport for landplanes which will be adjacent to a harbor for seaplanes will be constructed on the south shore of the St. Lawrence River near Montreal, Canada, by the Montreal Airdrome, Ltd., according to a recent announcement of officials of the company. The property on which the company will develop the proposed airport will have a river frontage of several thousand feet, and the field will be over a square mile in area to permit taxying, landings and takeoffs in all directions.

The field will be directly accessible to Montreal by way of Victoria Bridge. Present plans include the construction of a seaplane base along the river bordering the field, so that seaplanes or flying boats can be moved directly from the water to the hangars which will be constructed along the shore. The company will provide hangars and other facilities at the airport which will be leased to manufacturing and transportation companies, flying clubs and glider clubs.

COSTA RICA STARTS AVIATION PROGRAM

By H. C. PLUMMER

AS the result of more than ten years of effort on the part of Tobias Bolaños, Costa Rican pilot, a committee has been formed to sponsor the development of aeronautics in Costa Rica. This committee is known as the Comité Pro-Aviación Nacional of Costa Rica, and headquarters have been established at San José with divisions in the chief cities throughout the republic. A marked impetus in the development of aviation, both commercial and military in the five republics of the Central American group—Costa Rica, Nicaragua, Honduras, Guatemala, and El Salvador—is expected to result from the activities started by Señor Bolaños.

The Comité has started activities for the purpose of raising funds for the establishment of a definite program of aeronautical development, which includes the founding of a ground and flying school in Costa Rica.

Señor Bolaños qualified as an airplane pilot in France shortly before the beginning of the World War and served as a pilot in the French army until the Armistice. He was then pensioned by the French government and returned to Costa Rica where he started a campaign to interest the government officials and civilians in the establishment of a national school of aviation, and in the development of the aviation industry in Costa Rica.

His efforts to make Costa Rica air-minded extended over a period of more than ten years. He made little headway in his efforts and met with discouragement until recently, when the newspaper *La Tribuna*, published at San José, sponsored his campaign. Coincident with the coöperation of the press, changes occurred in the personnel of the national government which resulted in a more favorable attitude on the part of public officials toward Señor Bolaños' plans for the development of aviation. On September 22, 1929, *La Tribuna* sponsored a mass meeting at San José at which Señor Bolaños' plans were discussed and which resulted in the formation of the Comité Pro-Aviación Nacional. The Comité immediately began to organize a program of events and entertainments for the purpose of raising funds to support the aeronautical development project.

The Comité secured the endorsement of don Cleto Gonzalez Viquez, president of Costa Rica, and sponsored the appointment of Señor Bolaños as commandant major of the military service, and head of the school of aviation which was founded. Shortly after this, the Mexican government presented a two-place biplane to the government of Costa Rica and the ship was placed under the charge of Señor Bolaños. He uses the ship for instruction purposes in the flying school. At present, Señor Bolaños is the only licensed airplane pilot in Costa Rica. However, it is expected that an air corps unit will be organized as an important part of the national aviation service and that both civilian and military pilots will eventually be trained as the result of the extensive program which has been organized.

The honorary presidents of the Comité Pro-Aviación Nacional include Gonzalez Viquez, president of Costa Rica; Gen. don Arturo Quirós, minister of public safety; Gustave Richaud, and Henri Peyroutte. The officers of the Comité are as follows: Prof.

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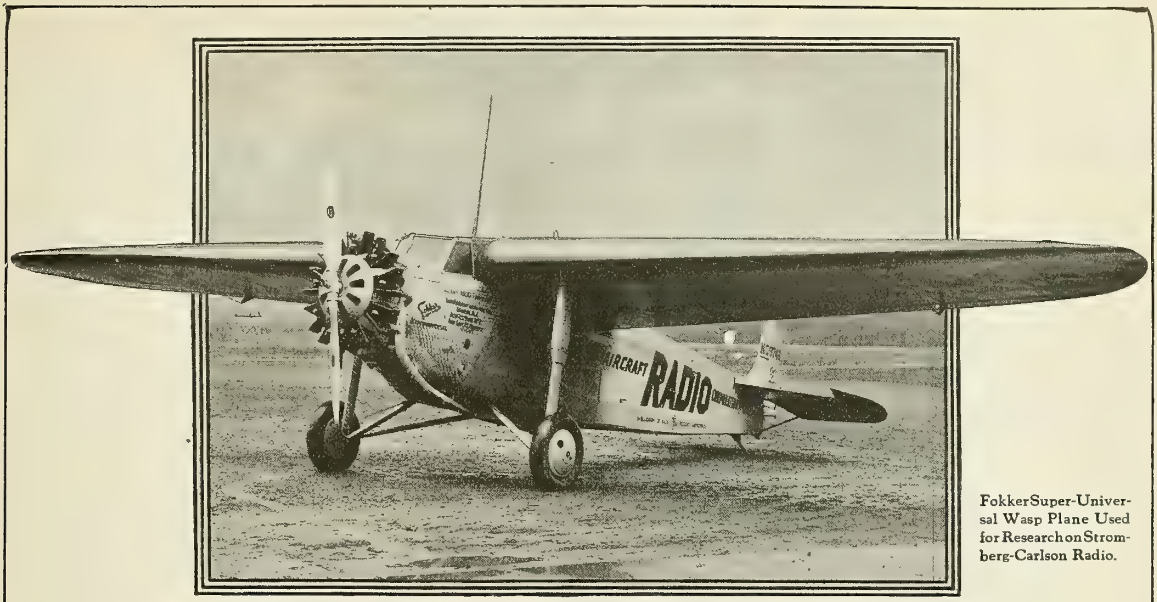
Boeing transport used on the new air mail service of Western Canada Airways



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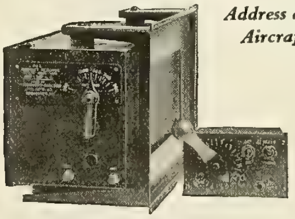

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MEXICO

[M. Hurst]

EXTENSION of the Transportes Aéreos Transcontinentales line, now operating between San Luis Potosí and Torreon northeast to Piedras Niegras, Eagle Pass, and San Antonio is contemplated for the near future by Eduardo Meade, president of the aviation company. Planes will be operated as far south as San Luis Potosí and passengers will be transferred at that point to the train for Mexico City. Many passengers find the trip to the Mexican capital by air at the necessary altitude of from 12,000 to 14,000 feet uncomfortable.

The proposed schedule for the Mexico City-San Antonio service is to make the air flight from the Texas city to San Luis Potosí in less than four hours, transfer to the train, and complete the through trip to Mexico City within nine hours. The Bellanca planes used by the T. A. T. make the trip from Torreón to Eagle Pass in two hours and ten minutes.

A FIELD radio station has been erected at Moralillo Field in Tampico by the Cia. Mexicana de Aviación. This ground station will handle communication with flying ships only, and the secondary station in the Yacca building will confine its service to sending and receiving inter-office radiograms. Two radio operators are employed at each of these stations.

THE first nine months of the use of Brownsville, Texas, as an international airport has shown a great deal of export and import trade and traffic with Mexico. During this period a total of 727 airplanes arrived at the port from Mexico. These planes carried a total of 2,694 passengers and 2,880 pieces of baggage. Exports were almost nine times as great as imports. The international port of Brownsville, across the river from Matamoras, Mexico, is filled with air activity of both countries.

Col. Lezama, Gen. Azcarate and Capt. Bretón, leading Mexican aviation officials

APPROXIMATELY seven tons of air mail and fifteen tons of express matter have been transported by planes of the Pickwick Latin American Airways tri-weekly line linking Los Angeles with Mexico City, Guatemala and San Salvador during the five months the system has been in operation, according to an announcement made by Thomas E. Morgan, general manager of the line. In the same period, two thousand passengers traveled over the line. Although the majority of passengers traveled from point to point, a considerable number of travelers made the through journey from Los Angeles to Mexico City, Guatemala City and San Salvador. Air mail on the Mexico line averages over twenty-five hundred pounds a month, and the volume of express is more than double that figure. The volume of express exported from Los Angeles and San Diego exceeds the incoming express by approximately three to one, the report shows.

THREE Avro planes have been given to the Veracruz civil aviation school at Veracruz by the Mexican government. Much interest is shown by both the government and the public in civil aviation at Veracruz and every means is being used to stimulate its development.

A NEW aviation field, equipped with hangars and all other facilities and conveniences, will be constructed at Ciudad Victoria, Mexico, by the state government with the assistance of the Mexican military authorities. Col. Alfonso F. Fernández, recently submitted plans for the field to General Joaquin Amaro, secretary of war, who approved them. The field will be situated about one kilometer from the city and will be of sufficiently large dimensions to enable planes to take off and land in any direction. It will be equipped with two intersecting runways, each 1,300 feet in length. Two large hangars will be constructed. Work has started on the field and will require four months to complete.

THE Aero Club of Chihuahua, Mexico, is making arrangements for the establishment of a flying school. Each of its members has pledged himself to invest six hundred pesos toward the founding of the school and the purchase of the first plane. Much interest has been manifested locally in the establishment of the school.

PERU

[H. Gomez-Cornejo]

GOVERNMENTAL decree drawn up by the Peruvian Ministery of Marine and Aviation regulates the use of the government's airports by commercial and privately owned airplanes in Peru. Such airplanes must pay the Department of Civil Aviation $.75 for each landing at any of the government air-fields. These fields are located in the following cities: Tumbez, Talará, Piura, Paita, Pacasmayo, Pimentel, Trujillo, Chimbote, Ancon, Las Palmas (Lima's military air base) Pisco, Camana, Mollendo, Arequipa, Ilo and Tacna.

The revenue obtained from commercial use will be applied to the maintenance and improvement of these landing fields. There are no hangar accommodations or personnel in attendance at any of the government landing fields except Las Palmas and Arequipa.

OWING to the mountainous nature of Peru, and the most inaccessible means of transport to vast and rich regions of the country, the department of public works and the emigration department have prepared an aerial photograph program, which has been approved under a governmental decree. The decree provides that any area to be surveyed for irrigation purposes, railroads, locating of colonies in the Peruvian forest of the Amazon, or other pioneering work, should be mapped out by airplane. A portion of the cost amounting to not less than thirty per cent of the cost per hectare, shall be paid by the owners of the land thus mapped and the balance may be met by a fund created for the purpose provided annually in the national budget beginning with 1930. The Cia. Aérea de Fotografía y Agrimensura S. A. are the concessionaries for the mapping and taking of aerial photographs in the country.

A WESTINGHOUSE night lighting airport system has been installed at Las Palmas, military and civil airport of Lima. It includes a light of 1,500 watts, supplying approximately 300,000 candlepower mounted on top of the wireless mast. Ground night landing lights have been installed on the entire frontage of the five hangars, and obstruction lights are mounted on the radio station, hangars, buildings and that ground area unfit for use.

THE Peruvian national air budget for 1930 voted at the last meeting of Congress, is $1,096,964. It is stated that orders for thirty ships have been placed in the United States with the Curtiss, Boeing and Consolidated Aircraft corporations for training and fighting craft. The planes will use 220-horsepower Wright Whirlwind and 420-horsepower Pratt and Whitney Wasp engines.

URUGUAY

AN international aircraft and accessory exhibition is scheduled at Montevideo, Uruguay, in conjunction with the Pan American Air Congress which will be held in that city during July. The exhibition will be held under the auspices of the Centenario Committee at the Escuela Militar de Aviación, and will include an international display of military and commercial airplanes, aircraft engines, aeronautical accessories, aerial photography, and aerial signal systems. The Pan American Air Congress will be a part of the celebration of the first centenary of the Republic.

THE PROGRESS OF AVIATION IN ITALY

[MAJOR CARLO DE RYSKY]

IN Italy, civil aviation received its first impetus in the years following the World War and military aviation was its forerunner. Stocks of materials and equipment contributed to maintain the new industry for a long period in a state of general crisis, and during the early period the personnel received little or no attention from the government then in power. During 1922, the government began to take an interest in aeronautical matters and from that time aviation in Italy has grown steadily.

Civil aviation and military aviation are still intimately connected with one another because of the fact that they are both under the control of the Italian Royal air force. Topographic and economic elements in Italy are not favorable to the development of civilian and military aviation under separate management.

Because the great mass of the population in Italy is very poor financially, aviation has not been developed as a sport. Also Italy is a relatively small country and has, therefore, no great distances to be covered to encourage the development of air transportation. Italy has a very extensive railroad system which runs across all her territory and permits the longest trips to be made in little more than one night. And while night flying has been undertaken in part of the country, more than three-quarters of Italian soil is mountainous, and the remaining part is so densely cultivated as to make forced landings difficult, thereby retarding the development of an aerial service which can compete with the railway system.

Nevertheless, the government is pushing on the formation and operation of airlines in every way, and is awarding important subsidies. Through the Royal Aero Club it is helping the development of private flying by providing that all amusement parks in the most important centers be alloted ground to allow the landing and taking off of aircraft, and that they be furnished with the necessary equipment for minor repairs.

The development of air-mindedness in youths is encouraged in every way. Flying and model competitions with money prizes are organized, and glider schools have been formed. The Royal Aero Club of Italy has instituted several civil flying schools with low rates of tuition, the pupils being able to obtain their pilot's licenses from the Air Ministry on completion of the course. In addition to this program of education, sporting events are almost always completed by some aviation feature including pleasure flights. In spite of the prevailing unfavorable conditions existing in Italy, popular flying and air-mindedness are thus progressing rapidly and popular interest in aviation is evident everywhere.

Greater facilities for the training of ex-military pilots are being offered this year by the Air Ministry and civil pilots are allowed the privilege of buying their own private training machines on installments. Industrial interest in aviation has been awakened in Italy.

In July, 1928, a statement was issued encouraging the principal aircraft establishments to develop light airplanes of about 80 horsepower (which is the power necessary to fly over the high mountain regions) which were to be easily maneuverable with low initial price and low maintenance costs. The aircraft produced made their first flying tests and were then exhibited at various aircraft shows all over Europe. Some took part in the International Light Plane Challenge organized in France for the tour of Europe; and others have made various demonstration tours, piloted by famous airmen. Commander De Bernardi made such a trip in the Caproni 100 T.

In the above mentioned International Light Plane Challenge, good results were obtained by Fiat, Romeo and Breda airplanes. Other firms are also producing such craft so that the Italian market is well provided for and Italy is actually in a position to export to foreign countries.

THE Italian Senate Committee for Aeronautics has approved a motion to preesnt Brazil with the Savoia plane 64, in which the Italian fliers Ferrerin and Delprete established a long distance record in July, 1928. The plane is to be given to Brazil as a token of appreciation for the courtesies

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WORLD'S LARGEST GASKET MANUFACTURER

CHUPP GASOLINE ENGINE

A WORKING MODEL TWO-CYLINDER ENGINE

By R. E. Dowd

WE all admire the beautiful seven-foot biplane model described in the March issue. In every respect it is a perfect miniature of a large machine. Even more remarkable is the engine of this little plane. As in the case of the plane, both the design and construction of the engine are the work of Mr. Carl B. Chupp, factory manager of the Pitcairn Aircraft Corporation of Willow Grove, Pa. Without going into every detail of the little engine, we can find plenty to interest us in its general features.

Perhaps the subject of gasoline engines may seem a little out of the scope of this department, but sooner or later we all must understand how gasoline engines run. If we aspire to be airplane designers, engineers or pilots, we certainly must know our engines. So why not get started now? Here we have the niftiest little two-cylinder, four-cycle, horizontal opposed, overhead valve, one by one model engine that ever took the air. Perhaps that description doesn't mean very much to you, but right here is where we start learning about engines.

In the first place we should know that the gasoline engine belongs to that class of machines known as the internal combustion type. This simply means that the power is obtained by the *burning* or *exploding* of fuel *inside* the engine. We must not forget that the airplane was made possible only when light weight internal combustion engines were developed for automotive uses.

Let's continue with our description of the Little Bitty engine. It is, as we said before, a two-cylinder, four-cycle, horizontal opposed, overhead valve, one by one. The first is easy, since we all know what cylinders are. We hear dads and brothers talking about Packard straight eights, Chevrolet sixes, Cadillac Vee eights, and so forth. These descriptions simply relate to the number of cylinders and the arangement of them. The Chupp engine has two cylinders arranged horizontally and opposing each other.

Now about the "cycle" of our engine. Only two types are in general use, the "Two" and the "Four" (see diagrams). When we speak of cycle we really mean stroke. In other words, in the two-cycle engine a spark ignites the gasoline vapor every two strokes of the piston, or every single revolution of the crankshaft. Two-cycle engines are used in small motor boats and sometimes for farm equipment.

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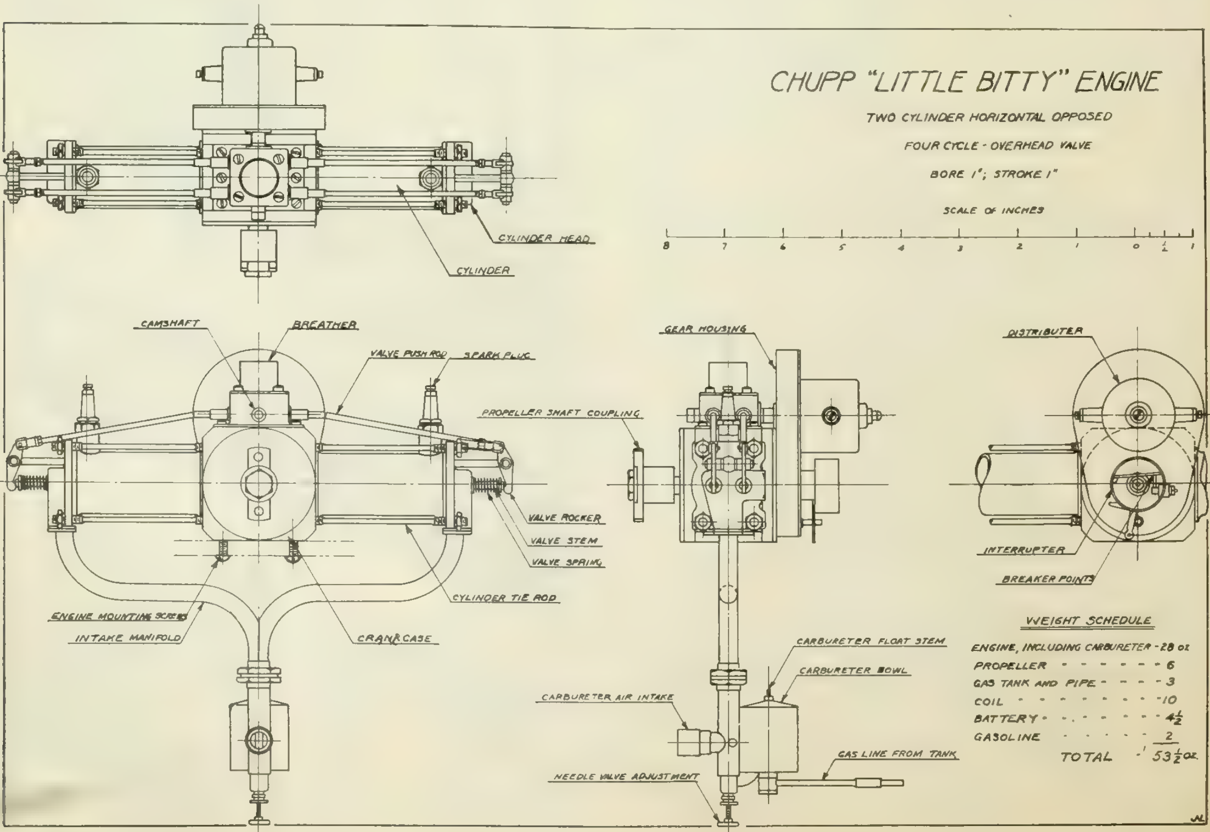

CHUPP "LITTLE BITTY" ENGINE

TWO CYLINDER HORIZONTAL OPPOSED

FOUR CYCLE - OVERHEAD VALVE

BORE 1"; STROKE 1"

WEIGHT SCHEDULE

ENGINE, INCLUDING CARBURETER	28 oz
PROPELLER	6
GAS TANK AND PIPE	3
COIL	10
BATTERY	4½
GASOLINE	2
TOTAL	53½ oz.

FIRST

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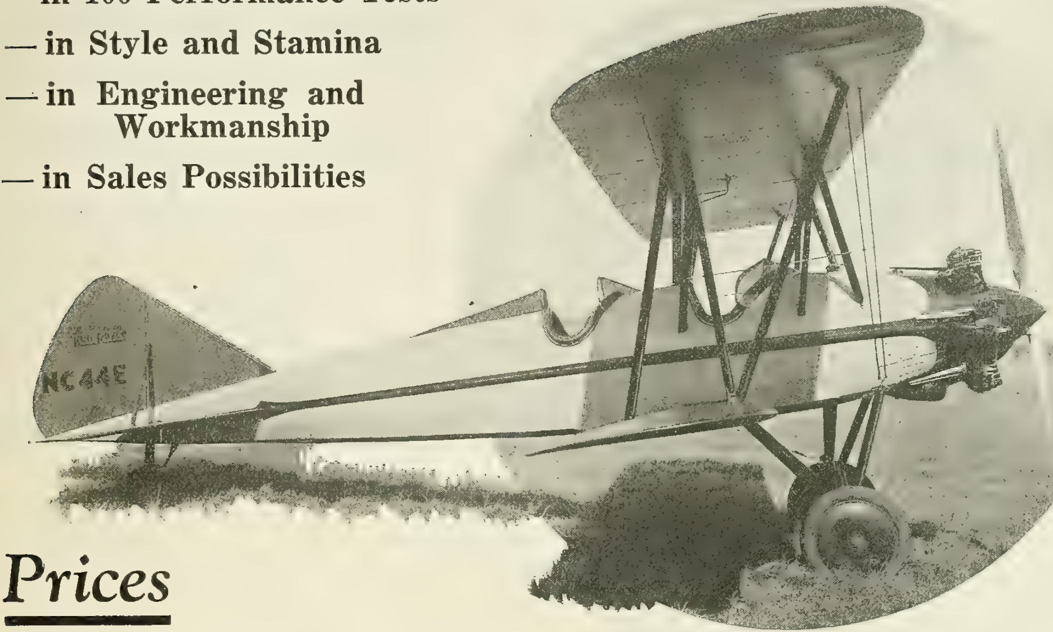

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Rearwin Ken-Royce Announces a price reduction of $1250 from former list.

Equipped with Curtiss Challenger 170 H. P. Motor (other motors optional).

Prices effective March 15th. Rearwin Ken-Royce quality remains the same with additional improvements developed by our engineering staff, for 1930 models.

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Let us prove to you, the possibilities open to you in handling this remarkable airplane. Our Dealer Franchise is exceedingly attractive. Write or wire.

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By REARWIN

LOWERED prices now bring this masterpiece of airplanes within the reach of a large new market. Efficient production methods, coupled with expected volume, make possible these new prices.

Every eye is on the Ken-Royce. This truly remarkable airplane has shown its amazing qualities in over 100 performance tests. Fast and powerful in flight, yet with every safety feature including slow landing speed, the Ken-Royce is the outstanding "buy" in airplanes today.

The Ken-Royce comes to you fully equipped including Steel Propeller, Brakes, Pyrene Fire Extinguisher, Cockpit Cover, Navigation lights, Engine and airplane log books, Instruments, etc. You owe it to yourself to investigate the Ken-Royce before buying an airplane.

Write for detailed information, specifications, performance record, prices, etc.

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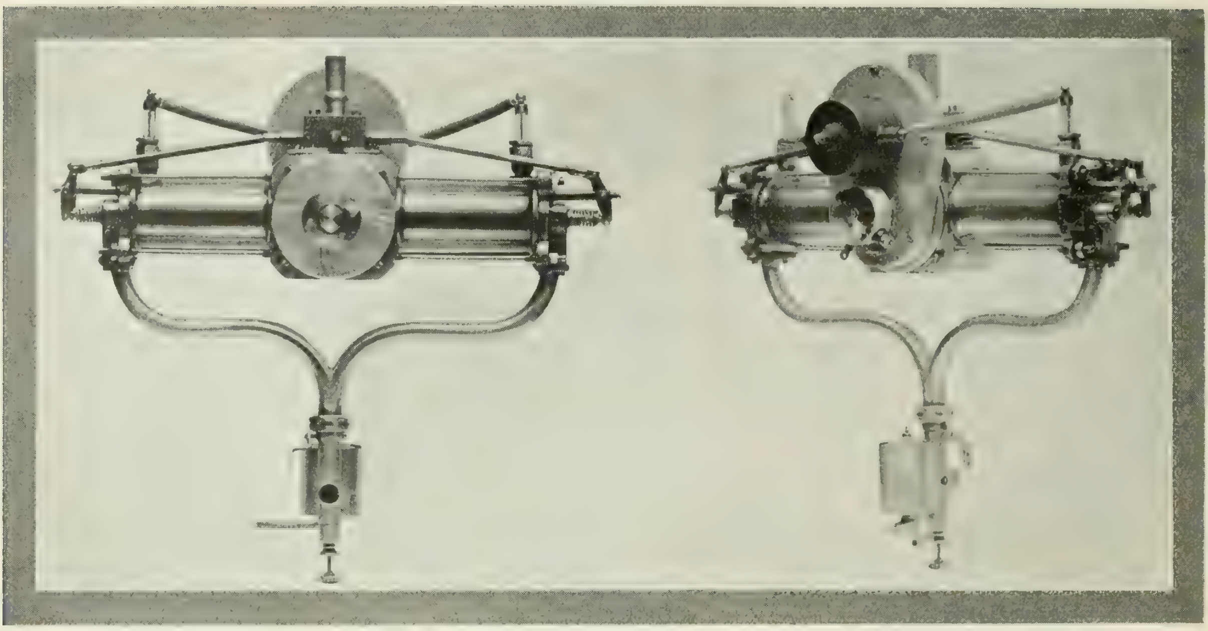


Front and three-quarter rear views of the Chupp two-cylinder gasoline engine for model airplanes

(*Continued from preceding page*)

Practically all automobile and airplane engines, however, are four-cycle. In this type the spark ignites the gas in the cylinder every other revolution. This design enables the burnt gases to be exhausted more completely and, consequently, the fresh gas to be drawn in purer. As a result the efficiency is greater.

We now have only "overhead valve" and "one by one" left. The first is self-explanatory. It is a little confusing, perhaps, to say "overhead" and find the valves at the extreme ends or sides of our engine but, of course, usually the cylinder arrangement is vertical, which would mean the valves would be on top.

"One by one" simply means the bore and stroke are one inch by one inch. The bore is the inside diameter of the cylinder and the stroke is the distance the piston moves. Of course, the stroke is always twice the "throw" of the crankshaft, or length of the crank arm.

Now that we have our description understood, we can proceed with a study of the various parts of the Little Bitty engine. Mr. Chupp has shown marked ingenuity not only in the design, but the selection and adaptations of materials and parts.

Cylinders, Pistons, Connecting Rods, Crankshaft and Crank Case

The cylinders are made from solid 3½ per cent nickel steel bar. There are no cooling flanges or fins and the wall thickness is 1/32 inch. A liberal shoulder is provided at the base to fit against the crankcase. The pistons are machined from aluminum bar and each has two cast iron rings. The rings, as you may know, are to make the fit of the piston tighter in the cylinder so that the power of the explosion will not be lost by leakage. It was necessary to make a great many rings before a correct fit was secured. The connecting rods are machined from solid steel bar and are provided with babbitt bearings. The double-throw crankshaft operates on ball bearings and is machined from solid bar. Aluminum bar machined all over was used for the crankcase. A large size breather or vent is provided in the top of the crankcase, permitting easy lubrication. The splash system of lubrication has been found entirely satisfactory.

Head, Valves, Pushrods, Rocker Arms, Gears and Crankshaft

The cylinder heads are cast iron providing valve seats for the 5/16 inch diameter valve heads, which are made of tungsten steel. The valve stems are only 1/8 inch diameter A clearance of 3/32 inch is found sufficient for the valves when lifted to the maximum Neat little push rods actuate the valves through small rocker arms. The angle of the pushrods is somewhat greater than we find on large engines because of the proportionally larger crankcase. The two to one gears are neatly housed on the back of the engine away from the propeller. The cam shaft used to operate the valves has a 5/64 inch lift.

Ignition-Battery, Coil, Distributor and Spark Plugs

The ignition system is operated on a six-volt system, so that for starting or bench tests a regular storage battery can be used.

For flight purposes the battery is made up of four ordinary round flash light battery cells. The spark coil is taken from a Dixie magneto with little or no modification. The distributor, which distributes the sparks to the cylinders at the correct time, is made from hard rubber. The contact points are of platinum in the breaker box. Carbon brushes are used in the distributor. An idea of the diminutive proportions of the spark plugs may be obtained from the ¼ by 28 thread which is the size of the base threads! The original insulators were made by the Corning Glass Works. The present equipment uses Mosler insulators.

The Carbureter

The most interesting part of this little assembly of precision is the miniature Zenith carbureter complete with float, weights and valve stem. Mr. Chupp was advised by every engine designer whom he consulted, that a special type of carbureter, operating on the capillary principle like a lamp wick, would be necessary. This type gave so little promise that he set about to make a miniature Zenith carbureter. The orifice for the gasoline to flow through is only .013 inch diameter. The drill used for this job seems scarcely larger than a human hair.

Mr. Chupp used a simple method to study the height of the gasoline in the bowl of the carbureter under various conditions. A glass tube and a rubber hose connection were all he employed. In other words, a temporary sight gauge was placed along side the bowl, which enabled him to determine the correct height for the orifice. To build such a plane and engine as the Little Bitty, one must have such resourcefulnes at his command.

Weights and Performance

A weight schedule is given below which we may accept as the crowning achievement of the entire project:

Gasoline tank and pipe.........	3	ounces
Coil	10	ounces
Battery	4½	ounces
Engine including carbureter	28	ounces
	45½	ounces

(*Continued on next page*)

Thompson Valves from Famous Cylinders

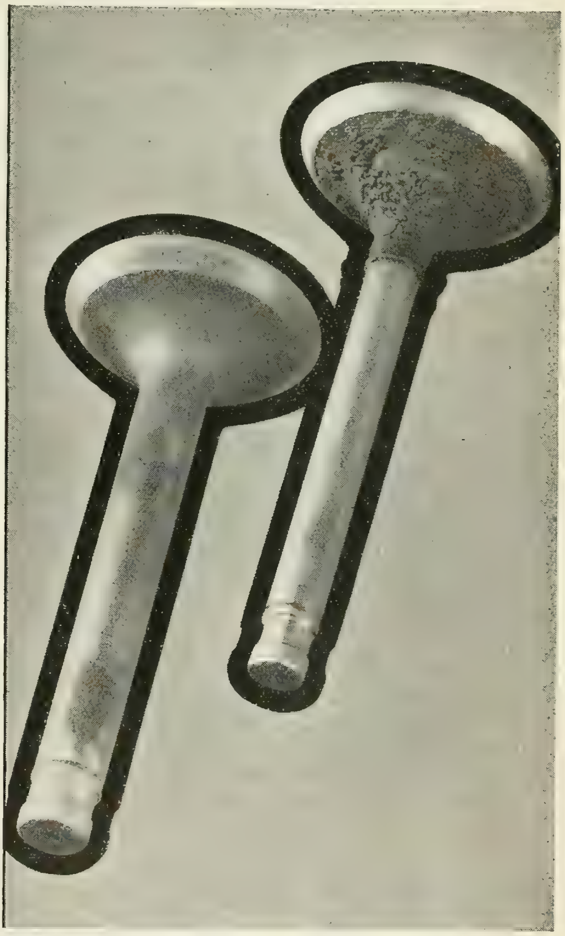
(This advertisement is one of a series showing Thompson Valves from some of the historic aero motors that used them in setting new world's endurance records.)

. . . from the "City of Cleveland"

Only valves of extreme accuracy and stamina could stand up under punishment like this! More than a week of rapid opening and closing — of cherry-red heat —of constant pounding on the valve seats!

Yet, after the 174-hour flight of the "City of Cleveland" in July, 1929, the Thompson Valves that helped set this record showed no evidence of deterioration. The unretouched photograph reproduced on this page shows two of them soon after the flight. Their condition is typical of the 18 Thompson Valves that flew with the "City of Cleveland."

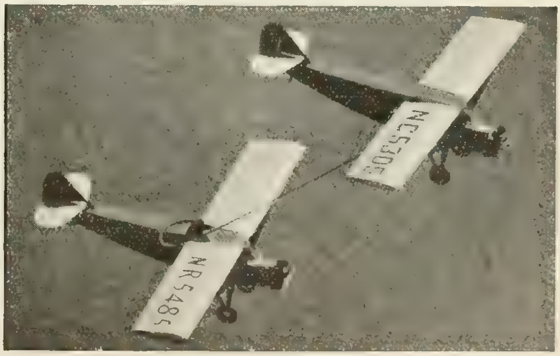
Performance such as this in every test has influenced aero engineers to specify Thompson Valves. Today, Thompson Valves are used in 95% of all American aero engines.



Two Thompson Valves that helped make history. An exhaust valve and an intake valve taken from the "City of Cleveland" immediately after its famous flight.

THOMPSON PRODUCTS, INCORPORATED
General Offices: *Cleveland, Ohio, U. S. A.*
Factories: CLEVELAND and DETROIT

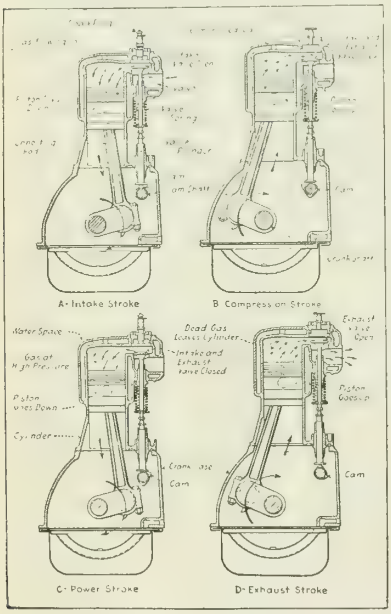
Thompson Valves



(Continued from preceding page)

We regret that, owing to the absence of suitable equipment, it was never possible to test this little engine on a dynamometer to determine its power. Apart from theoretical calculation, which would place the power at about 1/3 horsepower, about all that can be said is that it turned a 20-inch diameter, 11-inch pitch Hamilton propeller 2,000 r.p.m. giving a seven-pound static thrust measured with a spring balance. On a bench test a five-inch wheel was turned 3,000 r.p.m. In this case a tachometer shaft, some six or eight feet long, was used; and even though the resistance of this shaft was great, the indicator registered 3,000 r.p.m., the maximum possible with the instrument. After about fifteen to twenty minutes of this running, the test was stopped because the cylinders showed signs of excessive heating by a tinge of blue coloring.

It would undoubtedly be advisable to use a pusher design of model when gasoline engines are employed, so that the power plant would be protected from possible damage in landings. Delicate and precision mechanism such as we find in engines of this kind cannot well be hurled against obstructions without damage. Perhaps Professor Langley had the best plan of all when he conducted his flight experiments over water.

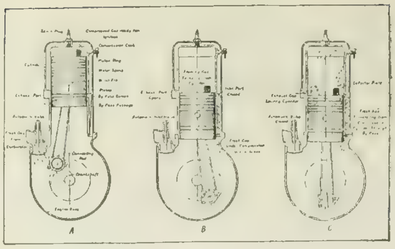


Sectional view of a gasoline engine cylinder showing piston movements during four-stroke cycle
(Diagram courtesy of the Norman Henley Co.)

There are still great unexplored possibilities in the field of mechanically driven aircraft, and we hope that more experimenters will be found active in this highly specialized art. The Chupp Little Bitty is a splendid example of such effort, but let's have more of them. How about using radio control?

Six questions you can now answer:

1. What type engine is used in the Little Bitty plane?
2. Explain the difference between the two and four-cycle principles.



Two-Port, two-cycle engine operation
(Diagram courtesy of the Norman Henley Co.)

3. Which type of engine is more generally used, a two or four-cycle? Give one reason why.
4. Can you describe the type of engine in an automobile by inspection?
5. What is meant by bore and stroke?
6. What is meant by r.p.m.?

CONTEST SCHEDULE AT N. Y. GLIDER CARNIVAL

THE schedule of events which will be held during the New York Glider Carnival scheduled to be held at Bayside, L. I., April 25-26 was recently announced by officials of the Aeronautical Chamber of Commerce, which will sponsor the event in conjunction with the National Glider Association, the New York Glider Club, the Aero Club of Long Island, and the American Motorless Aviation Corporation. Fourteen contests are scheduled.

There will be four divisions of duration contests, the first being open to novice glider pilots in primary training planes. The second event will be open to holders of the third class license and will be limited to primary training gliders. Second class glider pilots will compete in the third event which will be divided into two contests, one open to pilots flying primary trainers and the other to those competing in secondary gliders. The fourth event for duration of time will be open to first class pilots and will be divided into three classes; for contestants in primary trainers, secondary gliders, and soarers. Contests for accuracy in landing in primary trainers, secondary gliders and soarers will be held.

SIXTY primary training gliders were sold during one week recently by Gliders, Inc., a division of the Detroit Aircraft Corporation, according to an announcement of James Work, vice president of the Detroit corporation. The gliders were ordered by the following: W. T. Ponder of Fort Worth, Texas, dealer for the Ryan Aircraft Division of the company; the Pittsburgh Aircraft Agency Corporation; and the *News Sentinel*, published at Fort Wayne, Ind.

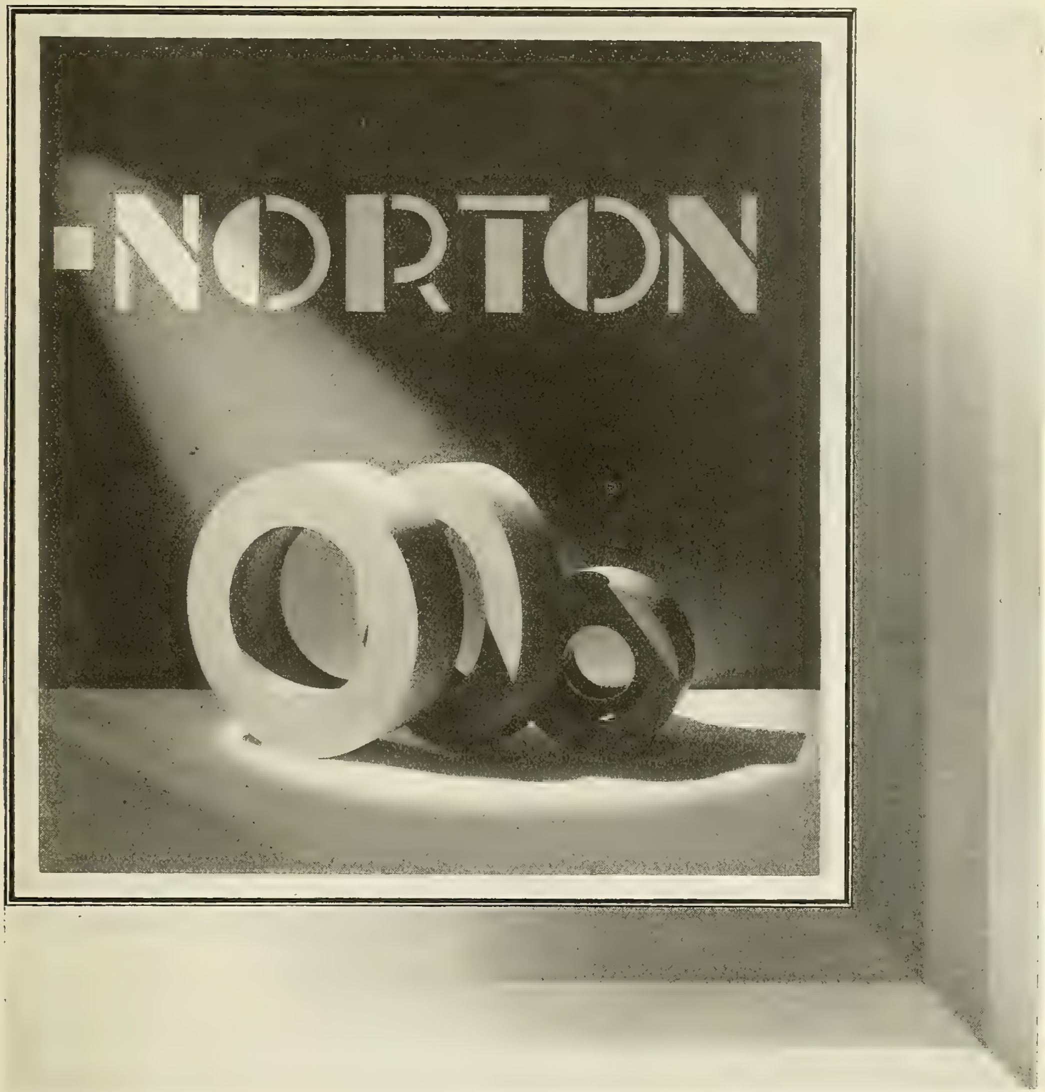
MR. FRANK M. BLUNK, Operations Manager, has announced the successful testing of the pontoon glider developed by Gliders, Inc., at Lake Orion, Mich. The plane has a wing span of 36 feet, chord 5 feet, and weighs empty 225 lbs. Mr. Blunk advises that the glider takes off easily when towed by pleasure cruisers at approximately 30 miles per hour air speed.

This sport should prove very popular and the added safety of over-water flying at slow speeds should have a wide appeal.

SHOREWOOD PUBLIC SCHOOLS JUNIOR AERONAUTS of Milwaukee, Wisconsin, recently conducted their second annual model balloon race. The event was won by Dick Lambert and Herb Jones with a distance of about 400 miles. An identification tag fastened to the balloon requests the finder to return it to the contestant. The balloons are large Weather Bureau type, thirty inches in diameter, inflated with hydrogen. The winning balloon was returned from Dobbington, Ontario, Canada. Activities are in charge of Mr. R. B. Newhauser, director.

CORRESPONDENCE from readers of Junior Activities is always welcomed. Send accurate descriptions and clear photographs of your models or gliders. Whenever the subject is of general interest, and space permits, such items will be published. Please enclose stamps for reply to your letters and be sure to write your name and address clearly. Address Junior Activities Editor, AERO DIGEST, 220 West 42nd Street, New York City.

Group of Scouts who visited the Goodyear dirigible "Pilgrim"



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PROBLEMS IN FINANCING DEALERS

(*Continued from page 82*)

a very serious obstacle presents itself and, unquestionably, is principally responsible for the slow progress made by finance companies generally in the formulation of adequate and helpful retail plans. About 1923, when aviation as an industry was regarded as an infant, interested legal minds were devising protective legislation and defining obligations and responsibilities. About this juncture what is known as the Uniform State Aircraft Law came into being and is now on the statute books of numerous states. Although many of its features are quite desirable, a certain section of the law is dangerously detrimental to the promotion of time sales, and until obviated, will constitute a serious sales resistance because of the protective insurance coverage it necessitates.

Reference is made and attention is directed to Paragraph 5 of the law, which reads in part:

"Damage on Land: The owner of every aircraft which is operated over the lands or waters of this State is absolutely liable for injuries to persons or property on the land or water beneath, caused by the ascent, descent, or flight of the aircraft, or the dropping or falling of any object therefrom, *whether such owner was negligent or not,* unless injury is caused in whole or in part by the negligence of the person injured, or of the owner or bailee of the property injured. *If the aircraft is leased at the time of injury to person or property, both owner and lessee shall be liable,* and they may be sued jointly, or either or both of them may be sued separately. An aeronaut who is not the owner or lessee shall be liable only for the consequences of his own negligence. The injured person or owner or bailee of the injured property shall have a lien on the aircraft causing the injury to the extent of the damage caused by the aircraft or objects falling from it."

Obviously, when this law was written, its sponsors and authors did not foresee the entry of finance companies into the aircraft field, and unintentionally, erected a serious barrier, the immensity of which is difficult to estimate but doubtless too dangerous to be regarded as normal business risk.

According to expert legal counsel consulted on the subject, the full responsibility of ownership within the meaning of the law may rest squarely upon the finance company, imposing upon it a liability of great magnitude.

In a number of states the use of a chattel mortgage is unwieldy, and in the case of Pennsylvania and Connecticut, it is prohibited. These two states do not recognize a chattel mortgage, and to finance aircraft within their confines, it will be necessary to use an additional sales contract; liability then is quite clearly defined.

It is conceivable and quite probable that a serious accident might cost the finance company many times its initial investment. A ship of great weight and power crashing into a principal city thoroughfare could injure or kill many pedestrians, injure or kill its passengers and its crew, completely wreck the ship, and cause tremendous property damage. Suits running into hundreds of thousands of dollars would result, for all of which the finance company might find itself liable. Certainly the normal recourse to which it has access would fall far short of satisfying the demands of such judgments.

It may be argued that such a catastrophe is remote and that the law itself is unconstitutional, but these arguments do not alleviate the situation. Insurance protection is available but, naturally, only within well-defined limitations which hazard and ultimate loss would far exceed. Here is a definite and substantial weakness in the finance company undertaking, and although the hazard has been accepted by some as a business risk, it is a makeshift expediency, unsound in principle.

This hazard will continue to exist until a satisfactory test-case has been decided, or an amendment, now proposed, has been accepted by the several states. The proposed amendment is as follows:

"If aircraft be sold under a contract of conditional sale whereby the title to such aircraft remains in the vendor, such vendor or his assignee shall not be deemed as owner within the provisions of this section, but the vendee or his assignee shall be deemed such owner notwithstanding the terms of such contract, until the vendor or his assignee shall retake possession of such aircraft."

In automobile finance, this question of ownership and consequent risk has been well and reasonably defined, and the position of the finance company as title holder under its conditional contract of sale, chattel mortgage or lease, is not deemed to be that of physical owner, and consequently, this far-reaching liability does not attach.

With all other factors substantiating recourse and making possible a true, logical and satisfactory rate structure, it is unfortunate to face the need of inflating rates commensurate with hazard that should not apply as a finance company obligation. There is no safe alternative at present, and for the general progression of the aviation industry through the stimulation of sales, which is possible only when the installment media is properly available, it is expedient and absolutely necessary to obtain the appropriate relief through concerted action of both finance companies and the aeronautical industry.

The influence of the Aeronautical Chamber of Commerce, the Department of Commerce, Aeronautical Branch, the Bar Association and all others interested in commercial aviation will be necessary to the clarification of the state laws and the limitation of risk imposed under them to permit a normal functioning of finance company machinery without guesswork or prejudice.

The terminology of the Uniform State Aircraft Law may be sufficiently ambiguous as to be productive of several varying interpretations. As long as it remains on the statute books without corrective amendment, however, the courts can consider the finance company as physical owner, subject, therefore, to all the penalties of ownership. Under these circumstances, it is quite essential to exercise the greatest care in the building and the handling of retail finance plans.

Under existing conditions with rapid depreciation and obsolescence an important item, it is wisdom to require a down payment of at least 33 1-3 per cent on total cost of ship, including insurance; terms not to exceed twelve months; a minimum twelve months' rate of ten per cent of deferred balance, plus insurance charges, with the following coverages made mandatory by this law: fire, theft, tornado, crash, public liability, property damage, passenger liability.

FROM the numerous demands already at hand, it would appear that a plan of broad scope is required for accommodating wholesale requirements at distribution points. The procedure adopted for the automobile industry very generally covers for aviation. The normal risk in automobile wholesale financing is not, however, as great.

A ship is financed on the usual trust receipt plan and gives the distributor or dealer the right to display it for

(*Continued on next page*)

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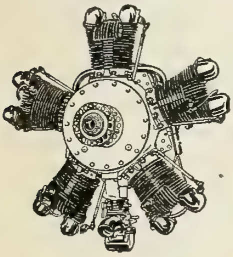

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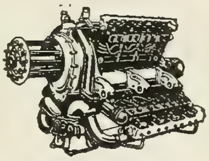

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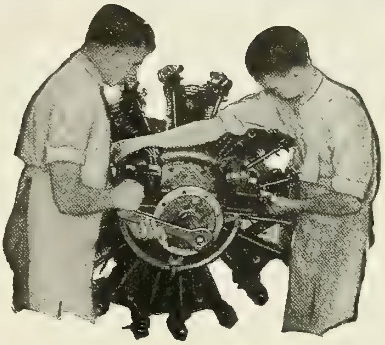

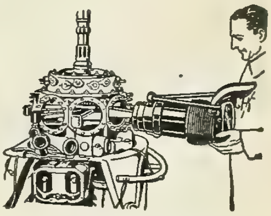

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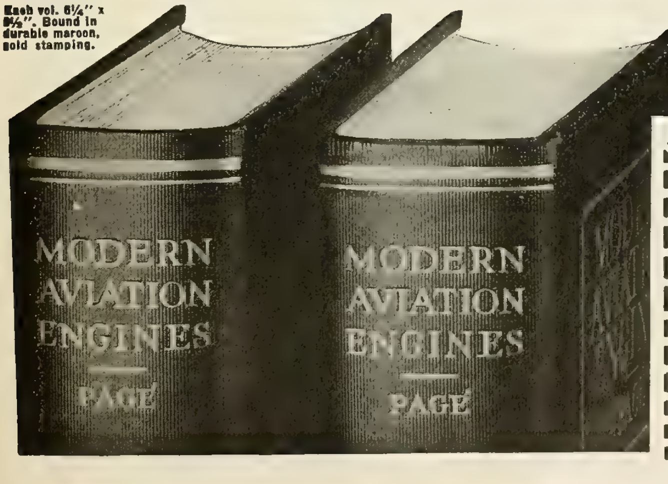

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(Continued from preceding page)

show purposes only, forbidding its use for demonstration. There is a greater probability of a violation of the trust agreement than is the case with automobiles; because the cost of a ship is so much greater than an automobile, and the average worth of the merchant may make it difficult, if not impractical, for him to purchase for storage purposes only, and because obsolescence is so rapid it might not be sound economy for the merchant to freeze so much of his capital by outright purchase of certain ships for storage.

Again the uniform state law plays its dangerous role. Assume a violation of the trust agreement by the demonstration of a plane, resulting in an accident. There is no question in this case that the finance company is the owner of the ship and, as such, is wholly responsible. The fact that the plane is flown "out of trust" without the consent of the owner or finance company offers no relief from liability, as will be evident from the terminology of Paragraph 5 of the Uniform State Aircraft Law.

Under the circumstances, it is possible to offer wholesale accommodations only to dealers and distributors of exceptional merit, both morally and financially. Since the normal hazards of wholesaling impose a substantial contingent liability on the finance company, it is obvious that the "paper" should carry full endorsement of the manufacturer, in addition to the dealer or distributor, if a comprehensive and flexible plan is to be made available.

For the present at least, wholesale facilities should be limited until the industry has progressed sufficiently along the lines of greater mechanical safety.

The terms for wholesale so far undertaken have required, approximately, an investment by the finance company not in excess of seventy-five per cent of dealer or distributor factory cost, excluding freight and handling charges; an initial maximum time limit of ninety days with renewals for an additional sixty days contingent upon a reduction of the finance company investment of at least ten per cent; a finance charge of one per cent per month with rebates for anticipations at a rate of six per cent per annum.

THE third important field for financing is previously referred to as "field equipment." As commercial aviation develops there will be a rapid increase in the number of flying fields owned and operated by corporate and individual interests. It is probably a fact that eighty per cent of the present fields are owned by municipalities and have been financed by means of bond issues. Civic pride and governmental influence have thus far played a large part in bringing aviation and its transportation value before the people of our country. Hence, the large number of airports recently constructed have been city and state undertakings.

As a matter of economy and facility, cities will require many additional airports which will, for obvious reasons, be largely private enterprises.

So far there has been a reasonable demand for finance company facilities by private owners, and some financing has already been done. Generally, the finance company's investment is secured through usual mortgage instruments, because the equipment upon its installation becomes attached to realty, and under certain circumstances and particular state laws, cannot be removed in the event of default on the part of the purchaser. Where title to the equipment cannot be arranged through lease instrument or conditional contract of sale, it is necessary to perfect recourse to the mortgagor and collateral through essential protective channels.

If the mortgagor owns the land upon which the field equipment is attached, the finance company's mortgage should be all-inclusive, giving it a direct and primary interest both in the land and equipment. Under this procedure, it should be possible to repossess the equipment in the case of default.

If the land is either leased to or mortgaged by the purchaser of the equipment, repossession is possible only when prior consent to such action has been legally obtained from the lessor or mortgagee, as the case may be. Subordination of their rights to the finance company is essential to sound and proper protection.

Terms and plans for this type of financing cannot well be made standard, because much variation will be found in the fundamentals of individual transactions. The question or recourse, rates and the length of time the obligation shall run, are governed largely by the utility and permanence of the project, the amount of the initial investment, the strength of security substantiating it.

AERONAUTICS IN EUROPE

(Continued from page 67)

course, is a return to water and chemically-cooled engines. European engineers are watching American work in the field of water and chemically-cooled power plants with the greatest interest. Many of them seem to feel that upon this development, with its potentialities in the way of larger power units, will control the future development of the big transport plane, whether for land or ocean flying.

In sport flying I believe England especially has a clear lead over the United States. The greatest success has attended the organization of flying clubs in that country. Its latest manifestation is the organization of visiting tours, the members of one club flying together to the fields of other clubs. These visits have already been extended to the Continent. It looks as if this activity would be a very important element in the immediate future of flying in Europe.

Contrary to some views here, the members of these clubs are not war-time pilots. They are the younger generation. They fly for sport. By combining their resources in this fashion, they find that they can get much more flying for a relatively small amount of money. The flying members of the clubs are still, for the most part, wealthy young men and women, but they are making progress in the reduction of the costs of this kind of flying and, consequently, extending the possible field of membership.

Nevertheless, the dominant impression one gets from the European picture is that narrow international boundaries, with all that they imply in varying treatment of aviation, are still the great barrier to the further development of the business of aviation, as they are the barrier to so much other business development on the Continent. Forward thinking economists have long urged the importance of economically united states of Europe. Unification of airline operation and uniform conditions for air transportation are very obvious needs in Europe at the present time. Little further progress can be expected until means are found to exploit aviation on such a sound economic basis. And once aviation has shown the way, it is not too much to expect that the way may lead to the simplification, through unified treatment, of many other economic ills of the older countries.

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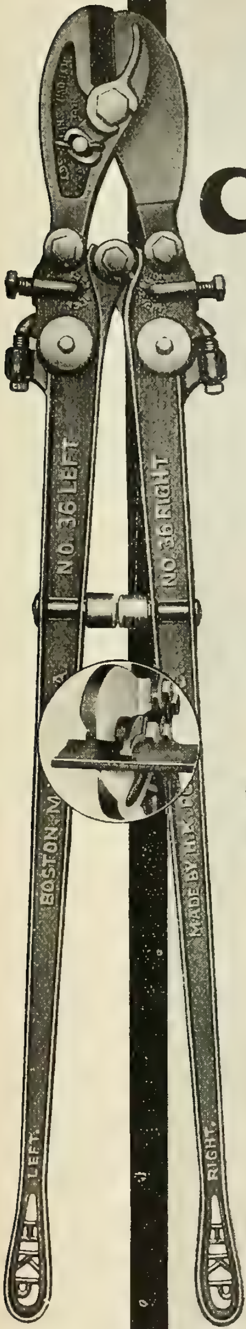
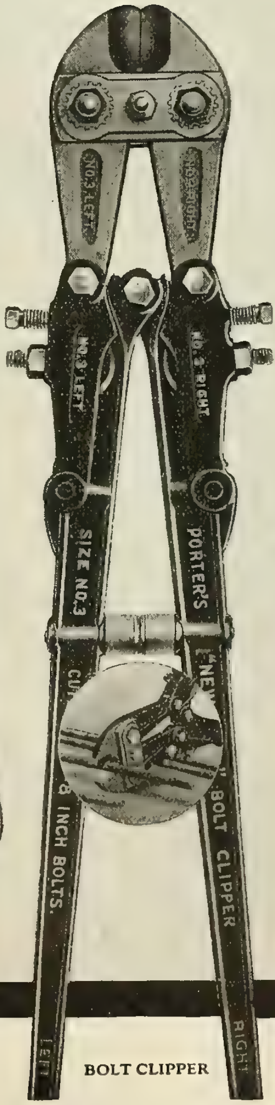


SHEAR CUTTER



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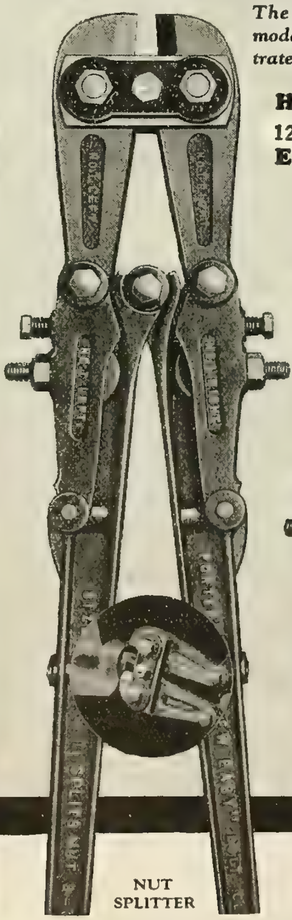

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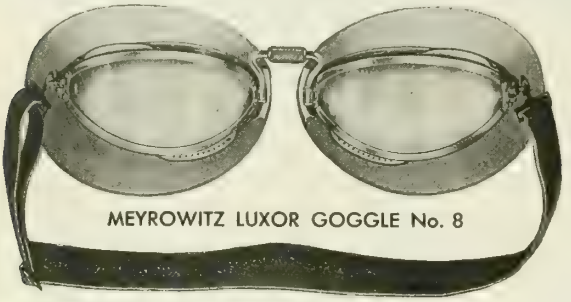

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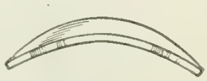

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ANOTHER PLANET HEARD FROM

(*Continued from page* 56)

and what makes you think so? Can you climb into the cockpit of a hop ship without wise-cracking about your own funeral?

(2). Have you ever had an airplane ride, and did you go anywhere? If you have had a ride, will you lie about it for the rest of your life or will you take another?

(3). Do you go to aviation shows? Do you buy anything there except ham sandwiches?

(4). Do you believe that the chief function of a municipal airport is to provide free exhibitions of parachute jumping?

(5). Do you profess your faith in aerial transportation but refuse to go up in anything but a captive balloon?

(6). Do you believe the United States should have a first class air force, provided it doesn't cost anything?

(7). Do you believe international peace can be guaranteed by scrapping three battleships which aren't built yet and appointing Emily Post in charge of submarine warfare?

(8). Are you waiting for someone to invent an airplane which goes straight up and down, like a corkscrew in a bottle of Scotch?

(9). Do you call every bad landing a "crash?" Do you privately consider that all pilots are hair-brained idiots with a suicide complex?

(10). Do you think that transport companies, air mail operators, flying services, manufacturers and aviation schools should make a living, like the inhabitants of an Irish village, by taking in each other's washing?

The consensus of public opinion on these matters would certainly be a big help to our favorite industry. It would be so valuable, indeed, that I should go right ahead with a poll if I wasn't so busy with a cold in the head, and also suffering from my annual spring outbreak of vegetable gardening. Until my seedling tomatoes get over their infantile ailments, I won't be good for much. So the best I can do is to make a guess as to how the poll would come out, and then see what can be done about it.

So far as I can foresee, the poll would prove very discouraging. We should discover from it that it is harder than we expected to teach an old dog new tricks; that the solid citizens of this country are a shade too solid to take kindly and enthusiastically to the wings we have provided for them; that aviation is somewhat harder to sell to a suspicious public than a new cigarette or a non-skid safety razor. I can't figure anything else from the facts in the case, not to mention those which might be revealed by my ten-cylinder questionnaire. The public imagination and public support haven't kept the pace which has been set by the technical progress of aviation and continued by its business policies. The industry today is organized, equipped and financed; it has its airports and airways in increasing numbers; it has the aid and encouragement of a friendly administration at Washington. It has the best commercial planes and pilots in the world; it has a whole continent to work in; it has the genius of American business on its side in fitting it into the scheme of transportation and communications. It has, in fact, practically everything but customers.

This pessimistic conclusion is not just the consequence of a finish fight with an income tax declaration, nor of indigestion, nor of a man who sees his coal pile going down faster than the thermometer goes up. It comes out of the facts and figures. The published totals for 1929 are tre-

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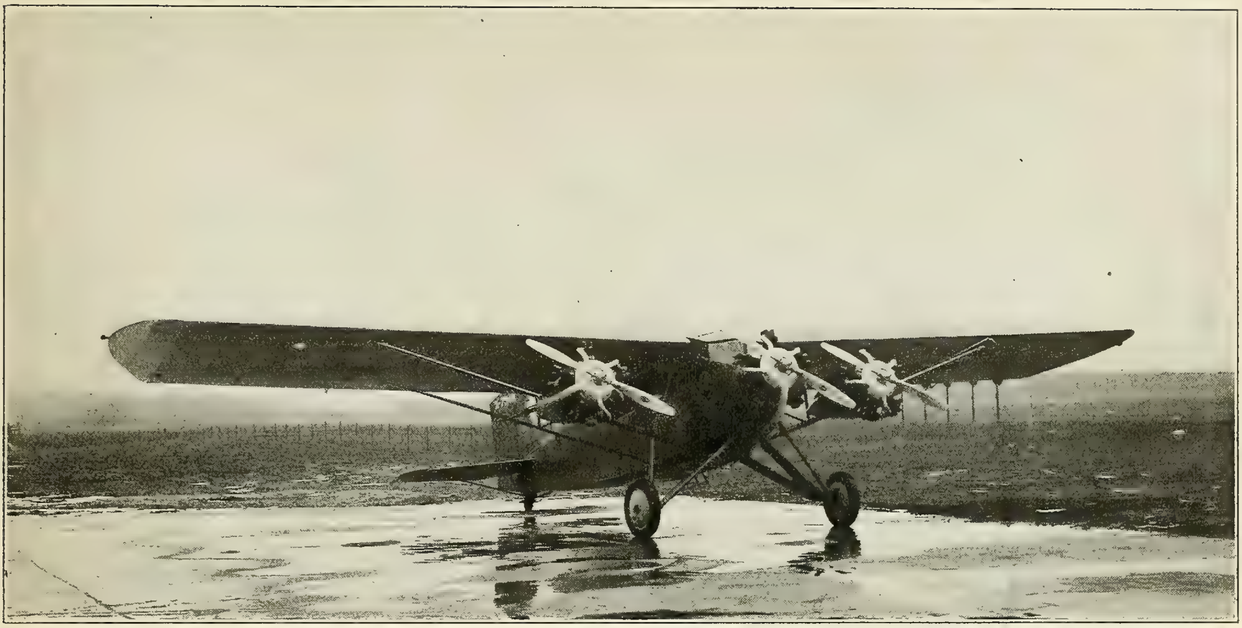

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To builders of aircraft, the most valuable asset, in fact, the "priceless asset," is a conscientious, competent personnel. Perfected machinery, modern factories, the finest materials, patents, money and physical assets innumerable, without a conscientious personnel to employ the use of them, will never result in safety to those who fly; and safety to those who fly is the all important objective.

When an airplane is built with a deep integrity of thought and effort, by men who are masters of their task, then no doubt need be harbored . . . for what their minds and hands produce will represent in every fibre, the integrity of its builders.

Presenting the new Hise Tri-Motor, its builders offer a plane which merits confidence. Built to rigid specifications by a conscientious personnel, no effort of mind or hand has been spared to make it worthy of the generous approval it has received.

To the pilot, it is a plane enjoyable to fly.

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Service Ceiling	10,000 feet	14,000 feet
High Speed	101 M. P. H.	125 M. P. H.
Landing Speed	38 M. P. H.	40 M. P. H.
Cruising Speed	85 M. P. H.	105 M. P. H.
Climb	700 ft. per min.	1200 ft. per min.
Fuel Consumption at Cruising Range	4 1/2 gal. per hr.	6 gal. per hr.
Cruising Range	300 miles	400 miles
Price Complete, Fly-away	$3285	$3995

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DAVIS D1 MONOPLANE

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(Continued from preceding page)

mendously encouraging in practically every respect except that of passenger traffic over scheduled airways. According to the estimable Clarence M. Young, whose business it is to know what he is talking about, there were 85,000 passengers carried on scheduled service in this country in 1929. It looks like a lot until you stack it up against the estimated investment devoted to carrying these passengers, and then it looks like nobody's business.

There's no sensible reason under the sun or the new planet why Americans should not travel freely by air. We are the most travel-minded people in the world, and we make more fuss over speed and comfort than has ever been made in the history of the world. We are naturally restless and naturally keen for novelty, and we have an amazing continent to stir around in. Our business interests are nation-wide and our social appetites chase us everywhere in search of good weather, good sport and good company. We leave our tracks all over the Old World; we fill the ships which sail the seven seas and crowd our own roads with tourist traffic. But we don't yet crowd the air, though there is lots of air at our disposal and an elegant and expensive fleet of shiny airplanes ready to use it for our comfort and convenience.

The fault doesn't lie with the industry, and it doesn't lie with the safety factor, which is a stuffed bogey and a poor excuse for a psychological condition. The average man isn't scared of airplanes any more than he is scared of his own automobile, which is a dangerous beast by all the evidence of vital statistics and insurance rates. He just isn't accustomed to airplanes, and nobody seems to know how to get him accustomed to them.

At the moment when I was pondering these conditions and circumstances, and finding nothing that looked like an answer to the problem, I received an invitation to visit a session of a model airplane club, maintained in Philadelphia by the Gimbel Department Store, which is one of the places where the wife buys the family shoes and shirts and shaving soap. I had a very pleasant afternoon. Moreover, I was made an honorary member of the Wipacs, an honorary member being one who pays no dues, does no work, and asks a lot of fool questions, and a Wipac being a member of the aviation club associated with radio station WIP of the Gimbel Brothers store. And I came away from there feeling much better.

There are about 2,300 Wipacs on the books, and there are also thousands of other model builders in the Philadelphia neighborhood. They build model planes, kit jobs and originals, some of them to fly and some to look at. The Gimbel store gives them the run of an entire floor for their experiments and flying activities, provides benches and tools, and keeps a staff of instructors on duty whenever the boys are around. And on a wet Saturday there are hundreds of boys there and the air is so full of flying models that a man of my perpendicular proportions is in constant danger of head-on collision with an ambitious monoplane or something.

I was thoroughly amazed at the work these boys are doing. Many of their models are exquisitely made, perfect in detail and thoroughly respectful to the aeronautical laws and prophets. They represent infinite patience and more actual knowledge of design and its consequences than I shall accumulate in the rest of my lifetime. Many of them, of course, are kit models, but the kit builder soon graduates to original work, and some of this particular group of designers were fooling around with things which looked like

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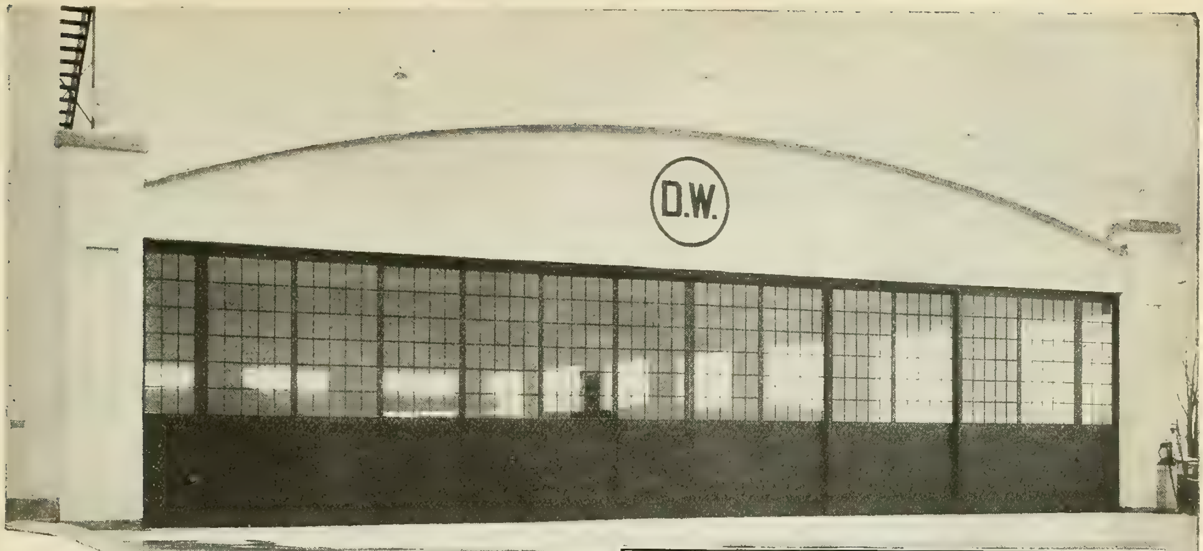

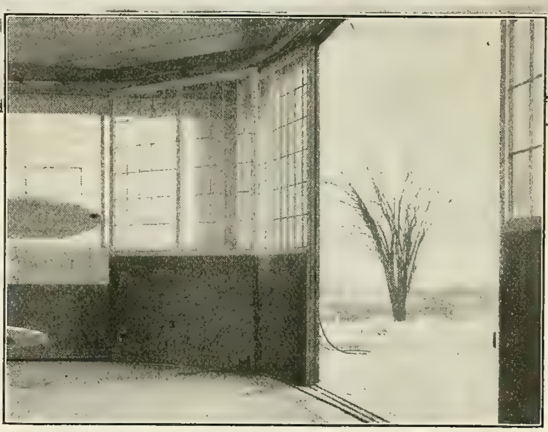

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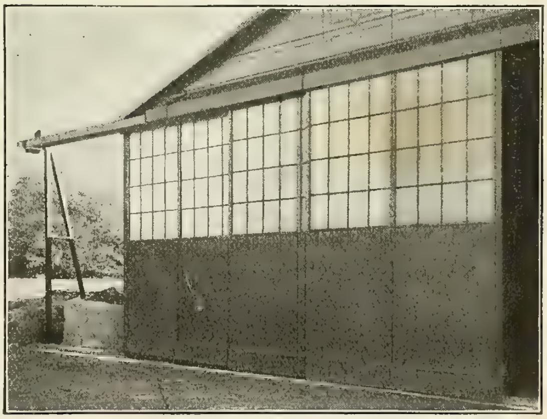

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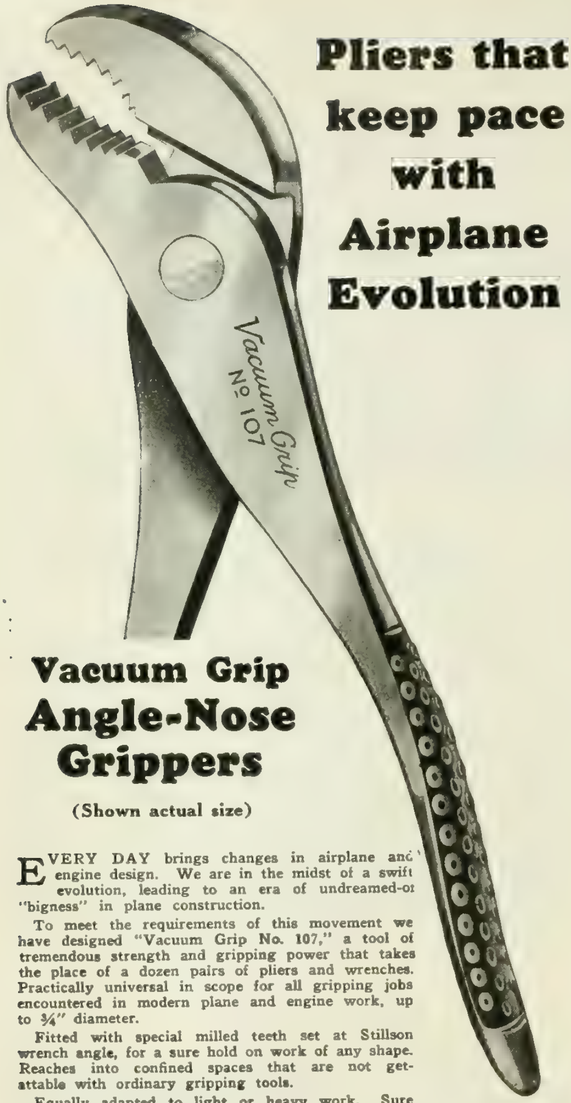

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(*Continued from preceding page*)

nothing yet seen on wings. Meanwhile, the "flying field" section of the floor was full of test pilots, shooting at the model records with their various contraptions.

I listened in here and there and was impressed to silence. To hear a ten-year-old youngster lecturing his equally venerable neighbor on his angles of incidence, dihedrals and wing curves was something to think about. I did try a few well-chosen remarks, but was spotted so quickly for a rank amateur that I shut up. These boys knew what they were talking about and I didn't.

I was impressed also with their professional and sporting spirit. Nobody meddled with another man's work; nobody horned in with advice or criticism where he wasn't wanted; nobody fooled away his time in rough-house. If a flying model got away from its owner and landed in another boy's hair he stood still and let it drop in its tracks, taking particular pains not to become a contributory cause to the accident. The instructors gave advice where it was asked and left the independent spirits to their own devices. If there was a bad crash out on the floor, nobody insulted the situation with sympathy, and the victim kept his temper and a stiff upper lip.

This was but one model-making and flying club in this city; there are several others. Philadelphia is only one of many cities where such things are going on. I don't think I exaggerate when I argue that the real future of aviation is in the keeping of these youngsters. They are not in the least like their unfortunate elders, who are trying—more or less—to adjust their stiff necks and squeaking joints and frozen arteries and flat feet to a new world, and making only a bungler's job of it. These boys are not talking about becoming air-minded, as though air-mindedness were something to be acquired like a coat of tan or a Harvard accent. They are growing up that way, and the airways are their ways from the time when they first get the use of their wits and fingers.

This is all very interesting to me, because I have six boys of my own and am wondering what is to become of them. I notice that the imprint of the air age is upon them, though I didn't particularly put it there. When the one who has just graduated from kindergarten suggests that I bring home something from the ten-cent store for his entertainment, I know that a tin automobile will do but an airplane will be infinitely better. I observe that a hammer and a handful of nails and a few orange crates are liable at any time to become an airplane in the back yard, and I am aware that nothing but my parental nervousness keeps the older ruffians from taking parachute dives from the back porch and testing gliders from the top of our ancestral roof. And I am compelled to believe that when the time and occasion arrive when these youngsters want to go somewhere by airplane, they will do so without making a fuss about it or thinking it an extraordinary demonstration of courage, independence and enterprise. At which time passengers will be considerably more plentiful than they are now along the airways of America.

It is generally agreed that one generation is likely to be a comparative stranger to the next, and this one will be particularly so. This is the great company which will instinctively follow the leadership of the choicest spirits of today, who are mostly youngsters themselves but have served aviation so gallantly and well. There will be ten thousand of them tomorrow for one of them today, and they will go confidently and naturally then where few but the pioneers have dared 'til now. You and I will probably be shaking our gray hairs about it, but it won't make any difference.

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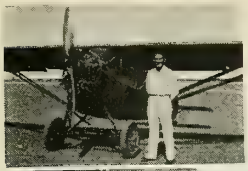

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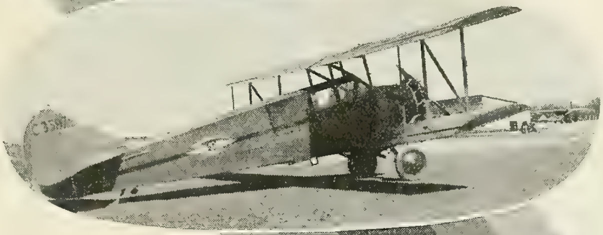

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Please send circular:
Interested in ground course☐ private☐ commercial☐ transport☐.

Name ....

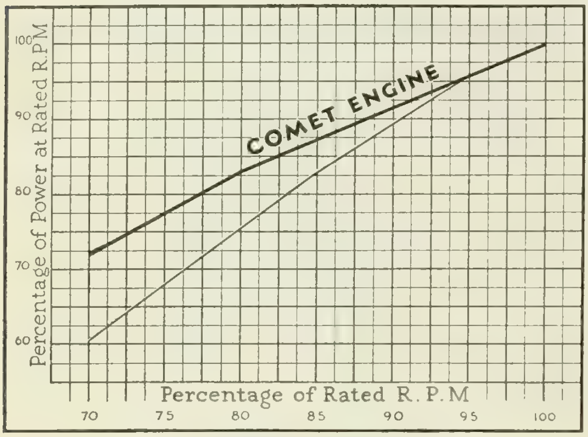
Address ....

....

OUR RATES

Ground Course (Free with flying courses)	$ 100
10 hrs. flying	175
20 hrs. flying	375
25 hrs. flying	425
50 hrs. flying	775
60 hrs. flying	900
200 hrs. flying	2500
210 hrs. flying	2650

THE COMET
"flat power curve"
for Safety



Comet Flat Power Curve
showing more efficient performance at take-off, as compared with that of another typical engine in the same power class.

FILL up the ship—open the throttle "full out" for the take-off—maybe a steep climb. The heavy load keeps the engine from turning full speed—the power is reduced. But that's when more power is most needed—and that's where Comet demonstrates one of its advantages.

Why?

The Comet full throttle power curve is more nearly flat over the operating range than that of most other engines in the same power class. This means that in taking off or in climbing, at full throttle, Comet is developing a greater percentage of its full power than engines whose power curves have a greater slope.

Look at the curves. Here the full throttle power of Comet is compared with that of another typical engine in the same power class. For example, with both engines at full throttle and with both turning at 80% of their rated speed, Comet is developing 83% of its full power, while the other engine is developing only 75%. This advantage gives Comet quicker take-off and faster climbing.

Or again, with both engines at full throttle, but both developing 80% of their full power, Comet is turning only 77% of its rated speed, while the other engine is turning 82%. Slower operation means less wear on working parts and, in addition, greater propeller efficiency.

Then too, the rated speed of Comet—1900 R. P. M.—is less than that of most other engines of equal power. Thus, throughout operation, wear is less and propeller efficiency greater.

Greater power at slow speeds is an essential feature of Comet design and contributes to long life and freedom from maintenance expense and costly replacements. This advantage, combined with the simplicity and distinctive performance of the single rocker arm valve gear, makes this engine particularly well suited to airplanes for private owners, training schools and commercial operators.

Two more reasons why owners of Comet engines are—

at ease in the air

COMET ENGINE
CORPORATION
MADISON, WISCONSIN U. S. A.
Address Inquiries to Room 104—215 So. Dickinson Street

Comet aircraft engines are manufactured at Madison, Wisconsin, under the direction of the Gisholt Machine Company, for 40 years builders of fine machine tools in use throughout the world.

(*Continued from preceding page*)

So I felt like a discoverer when I came away from the Wipacs, where boys were working at their play with their eyes on tomorrow. I felt that I had caught a glimpse of a new world—a very comforting prospect for those who are just now in the valley of discontent over the slow achievement of aviation's big promises. It won't be long now and these hundreds of thousands of boys will be men, taking over the world and running it to suit themselves. It will be a strange world, but it will have wings.

The spinning earth waited since the dawn of time to discover its brother or sister planet at the other end of space. Aviation is still young—not much older than its latest heroine, Miss Elinor Smith. Possibly the aviation industry must wait a little longer to collect what is coming to it, but this younger generation won't keep it waiting any longer than is absolutely necessary.

JOUKOWSKI'S VORTEX THEORY

(*Continued from page* 80)

For a given series of blade profiles it is possible to construct a diagram giving values of C_L as a function of AC_L thus permitting in the design of a new propeller to satisfy both the aerodynamical and structural requirements. (Figure 5)

When the vortex theory of propellers was originated, (1912-1916) numerous propeller analyses showed an excellent agreement of the theory with experiments. Lately the Central Hydro-Aerodynamical Institute undertook an extensive work in order to determine how well the experimental results would check the theoretical calculations. For this purpose check analyses were made of model propellers tested at the Royal Aircraft Establishment and reported in R and M 829. These tests were particularly valuable because the models were made of aluminum, resulting in considerable torsional stiffness of the blades.

The comparison of calculated and tested characteristics shows excellent agreement for values of relative pitch ranging from .7 to 1.0 which is the region commonly used in practice. For values of relative pitch higher than 1.0, calculated characteristics are larger than experiments would indicate, while for those below .7, the experimental values are higher than the calculated ones. (Figures 6, 7, 8 and 9.) This divergency can be explained by the use of average velocities.

In the case of small values of V/nD approaching the condition of stationary and helicopter propeller, the discrepancy between experiments and theory becomes considerable due to the fact that the blades are working at angles of attack approaching the condition of critical flow and, also, because of the assumption of cylindrical flow behind the propeller.

The experiments reported in R and M 829 cannot be considered as ideal, since the propellers were actuated by means of an electric motor which presented a certain obstruction to the flow and caused the well-known phenomenon of propeller-body interference, thus changing the condition of a propeller working in free stream of air. Tests made at the Leland Stanford University in this country on a series of wooden model propellers are exempt from this fault. In the latter case the characteristics calculated according to propeller theory were in good agreement with test results. (Figures 10, 11 and 12)

The second portion of this article by Dr. Watter will appear in the May issue of AERO DIGEST.

Quick and Sure with only half the shock

Decide how much your life is worth. Compare this price with the price of a parachute. If your life is worth the most—get a parachute.

If not—don't!

—E L Hoffman

Ten years of intensive development work by E. L. Hoffman, recognized world authority on parachutes, has made possible the remarkable action shown in the motion picture film enlargements on this page. The actual elapsed time between the top and bottom photographs is one and one twelfth seconds. But—even more remarkable—is the fact that this almost instantaneous opening action has been attained with *less than half the shock* to the jumper. Chief among the causes of this quick opening action is an entirely new design of pilot chute which weighs less and pulls more than any other type of pilot chute in use. A new method of ejection throws it five feet clear of the pack, independent of the force of pull on the rip cord. An advanced design of pack and pack release method adds materially to the speed of opening. The suspension line retainers allow the lines to come out easily at any angle of pull yet hold them in so they must pay out in the proper order. Figure 2 shows the action of the specially designed skirt hesitator. This arrangement insures proper stringing out of canopy so that the air stream can get into the mouth of the chute and fill it quickly, this prevents the chute from coming out of the pack in a wad, causing delayed opening or fouling due to entanglement of suspension lines with canopy. The construction and shape of the canopy leaves part of the skirt free to catch the air even when the pilot 'chute is pulling hard against the load at opening. An unprecedented canopy design spins out any twists in the lines sure and quickly.

Other advantages of the Hoffman Triangle Parachute are:

(1) Exceedingly low shock on opening. This fact has been ascertained by actual dynamometer tests. Less than half the shock experienced in most other chutes results from the opening of the Triangle chute.

(2) Excess strength margin shown by test drops made with 1200 pounds of lead. Such strength has been made possible by the new method of canopy construction and bracing and the new way of attaching suspension lines to develop the full strength of the line and allow adjustment of pull at any angle.

(3) Low rate of descent has been achieved through wind tunnel experiments which prove that the Triangle shape in sizes ranging from twenty-four inch models up to the 5000 square foot airplane chute has a greater lift than any other shape in use. Standing up landings are not at all unusual.

(4) The lack of oscilliation definitely eliminates the danger of breaking a leg or wrenching your back by landing when swinging like a pendulum.

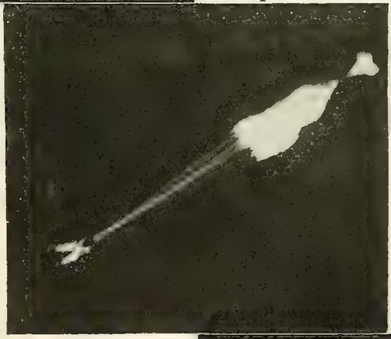
(5) The Triangle Chute always moves away from the tail over the right shoulder and can be turned to right or left by pulling on the risers over the left shoulder. A man can never land backwards with this arrangement.

(6) The stainless steel fittings or advance design are the only nonmagnetic fittings in use. The fasteners are so designed that they can be opened with cold, gloved hands.

(7) The harness and pack arrangement is vastly more comfortable in both the walking and sitting positions than that found on other chutes.

All of these advantages were scientifically developed by E. L. Hoffman and proven by thoroughly testing under conditions far more severe than can ever come in service. We shall be glad to send you the free booklet, "What to look for when buying a parachute and why," by E. L. Hoffman, Collier Trophy Winner and recognized world authority on parachutes.

Patents on all features applied for in United States and Foreign countries. Cost—no higher than that of the ordinary chute for the best in the world today.



ASK ABOUT OUR EASY PAYMENT PLAN.

Completely equipped service department for all types of chutes. The perfected Triangle harness, fasteners, pack, pilot chute and quick attachable mechanism applied to other chutes at factory. :: Chutes rented by day or week.

A new and better airplane SAFETY BELT designed by E. L. Hoffman is now available. Absolutely secure in use, yet quickly and easily released much simpler and easier to adjust. Warns you when unfastened in flight. It is always out of the way when entering or leaving the ship.

The TRIANGLE PARACHUTE Co.
GLOBE-WERNICKE BUILDING, CINCINNATI, OHIO

TWO WORLD'S RECORDS

first WORLD'S DISTANCE FLIGHT 1650 miles

(NON-STOP)

FOR LIGHT PLANES

In a grueling non-stop test of both ship and pilot, D. S. (Barney) Zimmerly, chief test pilot for Nicholas-Beazley, flew a Barling NB3 all metal-structured low wing monoplane from Brownsville, Texas, to Winnipeg, Canada, in less than 16 hours. This distance of 1650 miles at an average speed of 103 miles per hour is dramatic evidence of the stamina and ability of the Barling NB3.

and NOW

WORLD'S ALTITUDE RECORD!

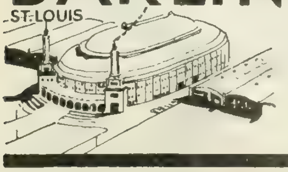
FOR LIGHT PLANES

Again the Barling has made a spectacular demonstration of superiority. February 16, 1930, during the World's Air Exposition at Saint Louis, with D. S. (Barney) Zimmerly again at the controls, a Barling NB3 broke all previous world altitude records for light planes—definitely establishing the Barling NB3 as the World's foremost light plane.

At time of going to press, the official government barograph reading had not been completed.

BARLING NB-3

Manufactured by
NICHOLAS - BEAZLEY
AIRPLANE CO. Inc.
MARSHALL, MISSOURI



CRASH OF THE MONTH CLUB

(*Continued from page 76*)

helps us manufacturers, but it gets the public thinking about airplane travel. You know, the only news that is sure of front page space is that relating to airplane crashes and prohibition. Consider a typical example now: 'Just imagine a man who has to go from New York to Los Angeles, we'll say. He's been out there before by train—a very tiresome journey. And he's about to start again when he reads: "Airliner crashes in storm."

Right away he's air-minded. Of course, he'd given some thought to air travel before. He had read about the various safety devices, such as radio beacons, that enabled a plane to fly right through a fog if it wanted to, as safe as anything. And he'd read about airplanes being safe, and all that, so long as they stayed up. But really, it hadn't made a great deal of impression on him. He'd got about to the stage where if anyone had tried to sell him a ticket on an airline he might have said, "Why, yes, I guess I'll try it." But when he reads that a plane not only has flown through a storm, but actually has crashed in a storm, the benefits of air travel are brought right smack home to him. You can just imagine him, with the newspaper clutched in his hand, rushing up to the ticket seller and shouting: "Give me a ticket to Los Angeles by air—I'm seeking adventure."

That must be the mental picture that pilots and airline executives have of the traveling public, or they wouldn't go to all the trouble and expense they have been going to in order to land on the front page. Everyone, they seem to feel, likes to get his name in the papers, and flying in bad weather appears to be as good a way as any to do it. The airlines might stress that feature when they're despatching a plane in rainy, foggy or snowy weather. A large sign might be placed by the door, right where all the passengers will see it: "The weather is bad, but we think we can make it. Travel by air and save time. Chicago or the front page in four hours."

The air mail lines have helped the manufacturers a lot—far more than the passenger lines have. They have been helped by a slogan that is very popular with all the boys: "The mail must fly." That has aided things a lot. For example, a pilot is sitting on Hadley Field, waiting for a storm over the Alleghenies to pass by. He's losing time. Then someone comes along and says, "The mail must fly. Neither storm nor night nor fog, nor past records of death and destruction shall stay these bold couriers of the sky. Hop off, kid!' And away he goes; and next morning away go about three dozen planes looking for his ship. All of which is a great help to Harry Sinclair and the gasoline business.

And it advertises the air mail—that's the real beauty of it. You take the people who haven't heard of air mail, or have only heard, now and then, sort of casually, that it saves time. Well, they're not impressed. But when they read, on the front page: "Farmers hunting for diamonds scattered in air mail crash!" they know at once that air mail is just the thing for their stocks and bonds and other valuables.

I was talking to an operations manager on the air mail the other day, and he gave me a picture that is very pleasing to me as a manufacturer with an airplane I need a customer for. "The important thing about air mail operation," he said, "is to maintain schedules. There's no use trying to compete with the train if you can't maintain schedules as regularly as the train does."

"Perhaps that's so," I agreed, "but it does seem to me that a train, having a pair of rails to ride on, is traveling at

(*Continued on next page*)

THE SAFETY FACTOR IN AIRPLANE SERVICE
MUST BE SAFEGUARDED

Fuel Line Breakage Now Protected

Approved by the Aeronautics Branch of the Department of Commerce for use on fuel and oil lines on licensed aircraft.

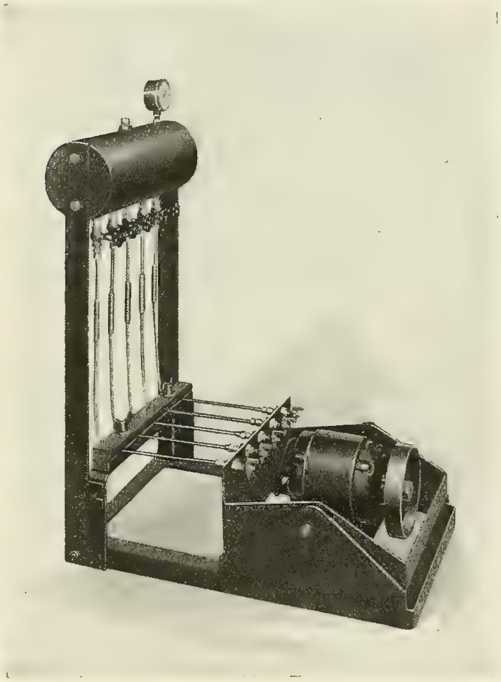
SKY-SERVICE
HI-DUTY CONNECTIONS
VIBRATION PROOF

Result of Hundreds of Vibration Tests

Adopted by
Sky Specialties Corp.
for
Heywood Starter.

Scientifically Developed

This test machine, which will be shown at the Detroit Show, magnifies actual service conditions. It was used for testing every known type of coupling and from the results obtained the Hi-Duty connection was developed.



Characteristics of the Hi-Duty SKY SERVICE Couplings.

1. Minimum deformation of tube in assembly of the couplings.
2. Minimum restriction in area of tube.
3. Vibration-proof.
4. High in hydrostatic and tensile strength.
5. Physical strength combined with a minimum of weight.
6. Simplicity of design combined with ease of assembly.
7. Long-wearing qualities.

Also Manufacturers of

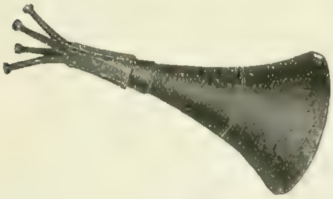
AIRCRAFT SANITARY EQUIPMENT AND AIRCRAFT WELDING EQUIPMENT

At Booths 13-15, Ingalls Airway

DETROIT ALL-AMERICAN AIRCRAFT SHOW

IMPERIAL BRASS MANUFACTURING CO., CHICAGO, U. S. A.

AIR TRANSPORTATION MADE SAFER
With the RACON AIRPLANE SPEAKER



THE use of radio in aircraft operation is made doubly valuable with the new Racon amplifier. Air transport companies will find it of inestimable value in the safe delivery of passenger and express cargoes during bad weather. During recent tests in Chicago, in a snow storm, the voice was distinctly audible more than a mile away. No pilot or operator can fail to realize the import of establishing communication between the plane and the ground crew preparatory to landing when visibility is so poor that a safe 'set-down' is nothing more than a matter of a good guess and plenty of luck.

FOR AERIAL ADVERTISING

Through the Racon Airplane Speaker the broadcaster's voice can be heard for miles. Even though the plane may be hidden in the clouds, the voice—or music—can be heard above the din of city traffic. During the Chicago tests music was broadcast from a phonograph record and was heard very clearly several miles away.

The Racon Airplane Speaker was designed for airplane or airport use. It is very light and compact and was built to withstand rapid changes in air pressure. Instead of the usual dynamic unit, the Racon horn is equipped with four apertures utilizing four Racon Giant dynamic units. Consequently the Racon horn has four times the ordinary volume.

Write for complete description and price

RACON ELECTRIC COMPANY

3 Mutual Street,
Toronto, Canada

18 Washington Place
New York City

Slough Bucks,
England

(*Continued from preceding page*)

a slight advantage over an airplane that on a foggy day is trying to ride a radio signal."

You know, one of the most cheering things to me as a manufacturer is the fact that an airplane no longer is recognized as having any limitations. It used to be that when the weather was real bad, the plane was kept in the barn. But that's all done away with under the efficiency that invariably accompanies big business, where one man has the privilege of sitting down and telling another man what to do. In the old days it used to be left to the pilot to decide whether the weather was too bad to fly through. But they've improved on that now. They've changed it around so the man who doesn't have to go is really the one who decides whether or not the plane shall go.

They got that idea from the war. If it had been left to the privates, there never would have been a battle. It was the general, who didn't have to do the actual fighting, who always gave the word. By which I'm not suggesting that it's the operations manager who tells the pilot to go. In plain words, every one in aviation has helped to build a feeling that an airplane should plow through anything. And that's what pushes a pilot off in bad weather—it's called *esprit de corps*, a French saying meaning that a corpse hasn't much spirit left, or something like that.

Of course, some of us old-timers know that feeling is founded, not on fact, but on fiction. But we've been so dazed by the amazing progress aviation has made—especially in Wall Street during the pre-Babson era—that we've felt constrained to keep quiet. So the transport and mail lines have gone on, merrily pepping up pilots with the idea that they can beat the weather, and some of the pilots have even come to believe it. The net result of which is that the replacement market for air mail and passenger transport planes is most satisfactory.

However, even at that we manufacturers are turning out more airplanes than the public and the operators are buying, so in an endeavor to stimulate consumption I am springing on a pulsating world my latest idea, guaranteed to remove all surplus planes. I am forming the Crash of the Month Club, and am offering a prize for the most outstanding crash of each month. Just what the prize will be I haven't quite decided. I thought of giving a silver cup, or something like that, but I thought it might be cheaper simply to hand the winner an unsold 1929 model—they're already made up and ready to roll out in numbers. You see them everywhere—I got one in my coffee the other morning.

However, that's a detail. The main thing is to stimulate airplane distribution to catch up with our production. Flying in bad weather may put you in the running for a beautiful prize accompanied by flowers, so follow the standard procedure of reading all weather reports optimistically. If the weather man tells you the weather is bad, laugh at him. Tell him he's a pessimist, and that every cloud has a silver lining. If he says, "We're in the middle of a low—stay down," smile gently and sing "Sweet and Low" to him as you take off. He'll admire your courage and I may get a customer.

And don't overlook stunts. Probably you don't stunt very well, but don't let that deter you. Go ahead anyhow; and stay low where we can see you.

Stunting is a great help in selling aerial transportation. Consider this instance: a man was undecided whether or not to buy a cabin plane. He already had an expensive limousine which he used only to ferry himself and his family here and there. He couldn't loop it, roll it or spin it.

(*Continued on next page*)

These Men are Responsible for your Training

at America's Largest and Finest Air College

Oliver L. Parks, Vice-President and General Manager of Parks Air College. Formerly a member of the U. S. Marine Corps. Member, Board of Directors, St. Louis Aviation Corporation. Mr. Parks has been closely identified with aviation development for the past 7 years. All courses at Parks Air College are personally supervised by Mr. Parks.

Edward S. Evans, President and Director, Detroit Aircraft Corporation. Treasurer and Director, Stout Airlines. Honorary President, National Gliders Association. Vice-President, Aeronautical Chamber of Commerce. President, Evans Auto Loading Company. Director of National Air Transport, Detroit Aviation Society, Detroit Savings Bank, Manufacturers Trust Co. of New York. Mr. Evans is one of the world's leading figures in the aircraft industry.

James Work, General Manager, Detroit Aircraft Corporation (of which Parks Air College is a subsidiary). Formerly Chief Engineer, Naval Aircraft Factory (1920-1926). Member Annapolis football coaching staff for 7 years. Member of the first crew of the dirigible Shenandoah. Mr. Work has long been prominent in aviation circles.

NO institution is greater than the men behind it. When you enroll for training at Parks, you place your future in the hands of men who have attained *undisputed national leadership* in aviation. Men whose names and achievements are known and respected throughout the aviation world.

Parks Air College is a division of the Detroit Aircraft Corporation, a giant industrial organization which includes five of America's finest aircraft factories. The tremendous resources, facilities and prestige of this mammoth concern are behind Parks.

No matter what kind of a training course you are considering, Parks—*above all other schools*—is best able to give you what you want. Do you aspire to a private, limited commercial or transport pilot's license? Come to Parks—here you will find a large staff of the most capable instructors, a great fleet of *over 30 training ships* of many types, and the most *thorough* and *complete* instruction courses imaginable. Come to Parks if you want to become an airplane and engine mechanic—we give you the same *quality of instruction* as our pilot students receive. *All courses are under Mr. Parks' personal supervision.* He tolerates nothing but the best and most modern methods of training for every student.

Wherever you live, it will pay you to come to Parks for your training. Don't gamble with your future. Your best chance of success lies in entrusting your training to this great, time-tried institution. Send coupon for details.

Parks Air College was one of the first to be licensed by the U. S. Department of Commerce as a fully accredited transport school

PARKS AIR COLLEGE
DIVISION OF DETROIT AIRCRAFT CORPORATION
460 Missouri Theatre Building
ST. LOUIS MISSOURI

»» COUPON ««

PARKS AIR COLLEGE,
460 Missouri Theatre Building, St. Louis, Missouri

Without cost or obligation to me, please mail your illustrated catalog.

Name
Street address
City State
Occupation Age

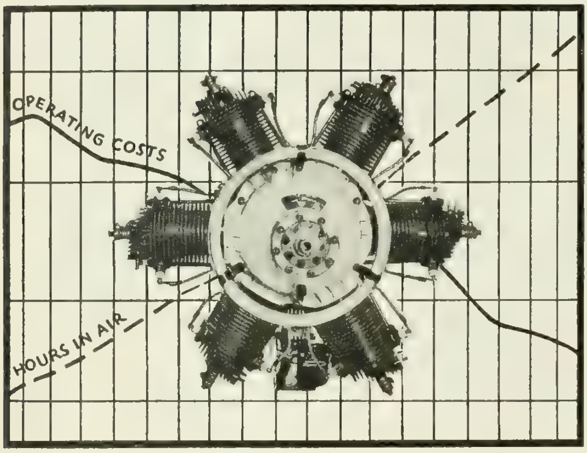
I am interested in
Pilot's Course ☐
Mechanic's Course ☐

SMOOTH, VIBRATIONLESS POWER

Brownback C400

TIGER

DEPARTMENT OF COMMERCE APPROVED TYPE CERTIFICATE No. 33



The place to break Records NOW is on the COST SHEET

SPEED, endurance, altitude, trans-Atlantic—these are al estimable records, well worth breaking, but the future of aircraft is more vitally concerned with breaking cost records of operation and of hours in the air.

The new TIGER aircraft engine smoothly develops 90 to 100 horsepower at an extremely low r. p. m.—at a weight of only TWO and ONE-THIRD POUNDS PER HORSEPOWER. Absence of vibration, simplicity of design and construction, accessibility of parts—these are contributing factors to the amazing low cost of operation and the largely increased number of hours in the air made possible by the TIGER.

Write for descriptive literature including complete specifications—or ask for demonstration of the TIGER in the air. AERONAUTICAL DIVISION, **LIGHT MANUFACTURING & FOUNDRY CO.**

Pottstown, Pennsylvania.

(*Continued from preceding page*)

All he could do was to go places in it. Well, he was considering buying a plane to go places in, too—for he had heard that we were selling fast transportation, and that was what he wanted.

Well, the salesman, a very clever pilot, proceeded to demonstrate this aerial sedan by putting it into every conceivable position where the discomfort of a passenger would be most intense. He looped it, rolled it, spun it, climbed it at stalling angles.

After he had landed, the pilot-salesman said to his customer, "You see how maneuverable this ship is—handles like a pursuit plane."

"Truly wonderful!" breathed the customer, mopping his brow and actually panting and gasping with admiration. "Do you mean to tell me that I can loop and roll this myself, after ten hours' instruction'?

"Sure!" said the pilot.

"I actually can turn this vehicle on its back if I want to? I can even hang on the top of a loop—as you did that last time—and drop my wife and baby on their heads on the roof?"

"You can," said the salesman.

"Thank you!" said the customer, warmly and earnestly shaking hands with the pilot. "Thank you for a most enlightening demonstration. You're sure I can bounce the baby on his head if I want to?"

"Why, certainly!"

The gentleman again earnestly shook hands with the pilot, got into his limousine which would neither loop, roll nor spin—and drove away.

I believe he went home to get the baby.

AIR—HOT AND OTHERWISE

(*Continued from page 66*)

had but one accident since its beginning. My hat is off to Pan American.

IF we but had a really live civilian organization in American aeronautics, what good it might do! Some of the names upon the advisory committee of the N.A.A. are those of men who stand for everything that is progressive in American aeronautics. There we find even the revered name of Orville Wright, the great, the modest, the efficient, almost startling opposite of the self-seeker. There, too, we find listed General Fechet and Admiral Moffett. An organization to which such men (in spite of Hiram's presence in the group) will lend their names, should have a membership of a full million, instead of between seven and eight thousand.

When there is so great a necessity, as there is now, for such an association to wage the battles of aviation before the House and Senate, it is disheartening to realize that the organization upon which the industry should depend is devitalized and almost deceased, as is the sad N.A.A. As it is organized and managed at this time, it perceives few opportunities where there are literally multitudes. Those that it does perceive it ignores or wastes.

In a few months more it will be time for another election of its officers. There's the chance. The organization will be in a position to put into its most important office someone who can command the respect of the air-minded. Then it should reduce its annual dues to a dollar, reorganize along business-like lines and serve the cause of aeronautics as its charter members planned. It should give itself the distinction of electing Orville Wright as president, back him with the right associates and plan and have a million

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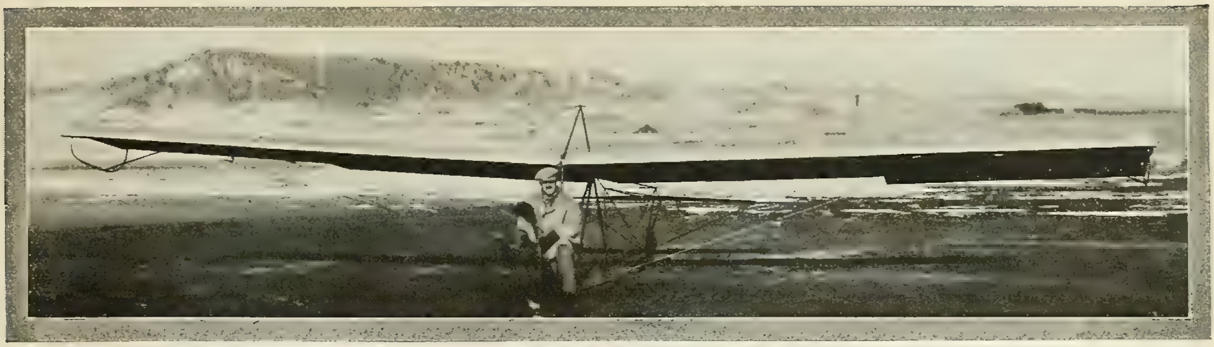


Large High-Lift Wing of Trainer Means Gliding Ability

Make $225 or More on Your First Three Gliders

Cash in on the most profitable phase of the aviation industry. Sell gliders. We are appointing hundreds of glider dealers throughout the United States who are receiving a 20 per cent commission. There is no discount on the first glider sold. Second and third sales draw commissions on a retroactive basis so that the profit on three gliders is $225 or more. Consistent effort should result in one or two sales per week. We tell you how. Send the coupon below for particulars.

Built and proven at an altitude of 6,200 feet by the airplane company which ranks third in number of licensed airplanes produced during the past three years, the Alexander Trainer is a primary glider of high capabilities. Thirty-six feet of wing spread and nearly 200 square feet of high-lift area give it flight characteristics at sea level generally attributed to the secondary type.

Designed especially for training, the Trainer is rugged throughout for rough landings and safe flight. One wing, inverted to simulate flight conditions, supports 1731 pounds of sand in the laboratory. Fuselage is of welded steel tubing with triangular construction at the points of greatest stress. Cost of replacing damaged parts of the Trainer is kept at a minimum because of this rigid design.

The Alexander Trainer may be launched successfully by either towing or catapulting. As an aid to students who want to learn the controls while being towed on the ground, it has been fitted with a rugged detachable landing gear as extra equipment. Priced at $40 the gear helps the student to maintain balance, makes towing easier and eliminates wear on the skid.

By utilizing aircraft factory machinery and skilled craftsmen familiar with production line methods the Alexander Aircraft Company builds the Trainer along airplane quality lines at a price which would be impossible were not such facilities available.

As spring is here, now is the time to make some handsome money forming clubs and selling gliders. Our club plan is an ideal method of glider ownership. A group of twenty persons may organize a club and buy an Alexander Trainer at a cost of approximately $20 each. This will pay for the glider and in most cases the freight costs. Club members may enjoy a most wholesome sport and save many hours of airplane instruction for less than the cost of one hour of airplane training.

We have prepared an interesting folder on how you and your friends may successfully organize a club and purchase a glider. Send for it today.

$375.00

F. O. B. FACTORY

Gliders are allotted in the order that $100 deposits are received. Whether you want to organize a club or glide your own, you assure early delivery by sending your deposit now.

ALEXANDER AIRCRAFT CO.

403 Alexander Industries Bldg.
Colorado Springs, Colo.

ALEXANDER AIRCRAFT CO.
403 Alexander Industries Bldg.
Colorado Springs, Colo.

Please send me your folder describing the Alexander glider and telling how to form a glider club.

I am interested in a dealership ☐

Name..

Street No...

City.. State..............................

Department of Commerce Buys Safety Chutes

Safety Chutes are now used by Dept. of Commerce officials.

The greatest tribute to the superiority of the Safety Chutes.

Acclaimed by flyers throughout the country, the Safety Chute pack is smaller, lighter, more comfortable, with three positive opening actions direct from the rip—of proven quicker opening.

You will be interested in the Safety Chute. It is different . . . . . . Write for Booklet "COMING DOWN."

High grade dealers are invited to write us regarding our exclusive sales franchise.

SWITLIK PARACHUTE AND EQUIPMENT COMPANY

TRENTON, N. J.

Also Manufacturers of
Flying Suits—Helmets—Face Masks—
Safety Belts—Wind Cones

(Continued from preceding page)

members in six months.

Nor is any of this program impossible of achievement if the local chapters send to the next convention delegates instructed to carry out their wishes for a really constructive program. Thus and only thus can the air in which American aviation must float to glory or disaster be cleared of Hire-'em and his hirelings. The right kind of a National Aeronautic Association would help considerably to make everything connected with American aviation prosperous.

AMERICA'S FIRST AIR JOURNEY

(Continued from page 77)

solemn farewell, as if he expected to land at the North Pole, and, throwing out some ballast, gave the signal to let go.

The balloon, of yellowish silk highly varnished, went straight up. As it went, Mr. Blanchard gave another bow that looked like a jack-knife dive, sitting. Then, producing a flag from his pocket, he waved it in a wide arc, showing that on one side it bore the French Tri-color and on the other the Stars and Stripes.

The band played, the people cheered, the cannon went off in a final and deafening crash.

Writing in his diary the next day, Blanchard described his getaway on this, America's first successful balloon journey.

"My ascent," he said, "was perpendicular, and so easy that I had time to enjoy the different impressions which agitated so many sensible and interesting persons who surrounded the scene of my departure, and to salute them with my flag. Accustomed as I have long been to the pompous scenes of numerous assemblies, yet I could not help being surprised and astonished when, elevated at a certain height over the city, I turned my eye toward the immense number of people which covered the open places, the roofs of the houses, the steeples, the streets and the roads over which my flight carried me in the free space of the air.

"What a sight! How delicious for me to enjoy it! I, for a long time, followed their rapid motions. For a long time, I could hear the cries of joy which rent the air.

"I was at the height of 200 fathoms when I felt a somewhat stronger breeze spring up, which carried me in an easterly direction towards the Delaware. Here I met a numerous and thick flock of wild pigeons. They seemed to be much frightened. Alas! it was never my intention in traversing the ethereal regions to disturb the feathered inhabitants thereof. They separated into two different parties and left a passage open for me."

Some of the young bucks about town galloped down the "Point Road," hoping to keep the balloon in sight, but the highway was crooked, and the balloon, traveling a straight course, was going away at what a chronicler of the time called "the amazing speed of twenty miles an hour."

As soon as the balloon was invisible to the spectators in the prison court, the President and his party left for their homes.

But the eminent Frenchman's adventures had hardly begun. He was in the air fifty-six minutes, at the end of which time he had traveled fifteen miles. He came down in a little clearing in the New Jersey woods, in Deptford Township near Gloucester.

The farmers roundabout, who had not gone into Philadelphia to see the start, were in on the finish. Fingering their long and flowing beards, their eyes shining with curi-

(Continued on next page)

Richfield wins again... and again!

RICHFIELD
AVIATION GASOLINE

2 New World's Records
WITH RICHFIELD

ELINOR SMITH, daring 18-year old aviatrix, in a sensational new altitude record for women at Roosevelt Field, N. Y. on March 10th! George W. Haldeman in a new altitude record for commercial planes at Wilmington, Del., on February 28th! *Two world's records within two weeks for Richfield motor products!!*

Miss Smith climbed to an altitude of between 30,000 and 32,000 feet in her Wright-motored Bellanca monoplane—shattering the old record by more than 6,000 feet. Haldeman, in his flight reached an altitude of approximately 33,500 feet, breaking the old record by nearly 8,000 feet. Elinor Smith used Richfield Gasoline, Richlube Motor Oil and Richlube Rocker Arm Grease and Haldeman, too, relied on Richfield to carry his Bellanca plane to a new world's record. In the words of Miss Smith:

"Richfield Gasoline and Richlube Motor Oil functioned perfectly in my record-breaking altitude flight. I always use Richfield products because all tests have proved them to be the best, on the ground and in the air. No little share in my success is due to them."

Use Richfield products in your own plane—available at aviation centers throughout the United States.

RICHFIELD

here's
the 1930
CAVALIER

A two place (side-by-side) cabin monoplane with big ship performance and refinements.

DESIGNED AND BUILT PRIMARILY FOR THE AMATEUR PILOT, FLYING SALESMAN, SPORTSMAN, FLYING SCHOOL, FLYING CLUB

Powered with Lambert 90 or Genet 87 complete with instruments, brakes, hydraulic landing gear. Flyaway factory, $3450.

Powered with Velie 60 or Le Blond 60. Flyaway factory, $2985.

PERFORMANCE WITH LAMBERT 90

Top Speed........120 mph. Landing Speed.....35 mph.
Cruising Speed....100 mph. Fuel Consumption . 5 gal. ph.
Useful Load.......527 lbs.

Star Aircraft Company is now in the 4th year of continuous manufacture. The experience gained in 18 years of constant flying is built into Cavalier monoplanes, which are distinguished by proven design, adequate production facilities, fine quality of workmanship and unquestioned financial resources.

The big market just around the corner for the small, well designed, well built airplane, is realized by forward looking dealers with whom correspondence is invited.

Star Aircraft Co.
BARTLESVILLE, OKLAHOMA

(Continued from preceding page)

osity, they gathered around the aeronaut and the rapidly deflating balloon.

Mr. Blanchard made his most profound bow and greeted them in voluble French. To which they were as responsive as a group of redstone images. They knew no French.

Aha! Monsieur Blanchard had an inspiration. He bowed again and, fishing forth from his breast pocket the document which George Washington had given him, handed it to the least dumbfounded looking man in front of him. That worthy let go of his beard, scanned the paper and brightened up tremendously. He read aloud to his compatriots:

"'George Washington, President of the United States of America, to all to whom these presents shall come.

"'The bearer thereof, Mr. Blanchard, a citizen of France, proposing to ascend in a balloon from the city of Philadelphia at ten o'clock a. m. this day, to pass in such direction and to descend in such place as circumstances shall make most convenient: these are, therefore, to recommend to all citizens of the United States, and others, that in his passage, descent, return or journeying elsewhere, they oppose no hindrance or molestation to the said Mr. Blanchard.

"'And that, on the contrary, they receive and aid him with that humanity and good will which may render honor to their country and justice to an individual so distinguished by his efforts to establish and advance the art in order to make it useful to mankind in general.

"'Given under my hand and seal at the City of Philadelphia, the ninth day of January, 1793, and the Independence of America, the seventeenth'."

After that, the farmers were Blanchard's enthusiastic admirers and willing slaves. A man who risked his one and only neck hanging to a bag a thousand feet above ground might be crazy, but if President Washington spoke well of him, he was worthy of courtesy.

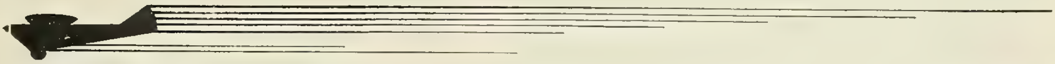
Blanchard showed them how to pack the bag into the car, and they did it. He informed them by pantomime that he wanted it transported to shelter, and four of them took the car on their shoulders. Another led forward a horse for the aeronaut to ride.

Blanchard mounted him, but between riding the clouds and riding a horse lies a vast and terrible abyss. The horse curveted, reared, pranced, plunged, waltzed and did every other discomforting thing that a nervous beast can do when under the hand of an inexperienced rider. He who had so gracefully soared into the sky, skilfully keeping his footing in a swaying car, was all over the horse, which did some ascending of its own—nothing like a thousand-foot ascent, of course, but enough to convince the aerial voyager that he was dangerously far from the ground.

Blanchard held on, now to the horse's ears, now to its tail. He was bounced, flung and tossed. He filled the air with French expletives and objurgations. The Frenchman was unseated and reseated with abruptness and repercussions. And, to make a sad story short, he got sick of that sort of transportation. He dismounted and, with a bow expressive of both thankfulness and relief, surrendered the horse to its owner.

"Not being sufficiently acquainted with the vivacity of the animal," he wrote in his diary, presumably while standing, "I was soon obliged to dismount, and I would have greatly preferred to return in the same manner as I came. I walked afoot at a great rate, followed by a

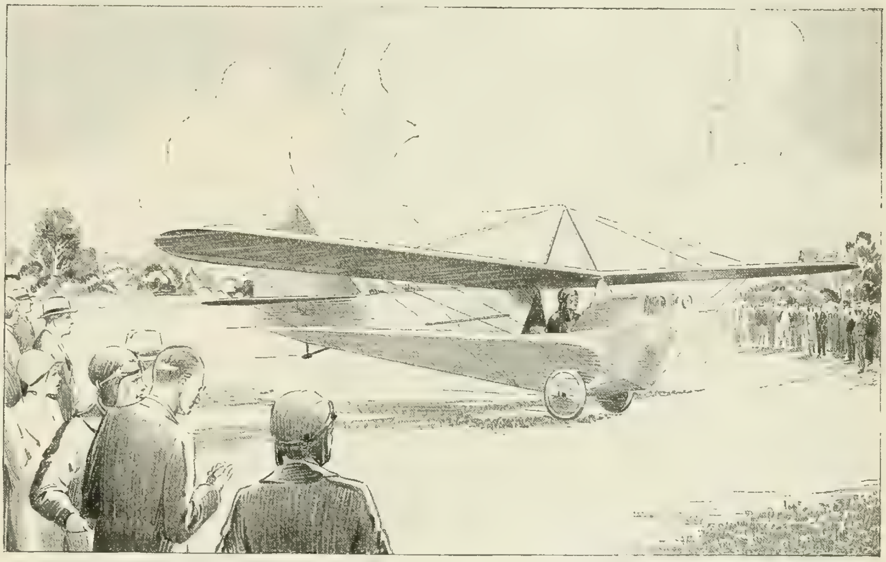
(Continued on next page)



AERONCA

SPECIFICATIONS

Span	36 feet
Cord	50 inches
Length overall	20 feet
Weight (empty)	375 lbs.
Weight (gross)	700 lbs.
Speed (cruising)	65 m.p.h.
Speed (high)	85 m.p.h.
Speed (stalling)	31 m.p.h.
Ceiling (service)	16,500 ft.
Motor	Aeronca E-107
Fuel Consumption	2 gal. per hr.



Take-off for official N. A. A. economy test. One hour and seventeen minutes on two gallons of gasoline.

The Most Talked of Plane in America Today

THE Aeronca C-2!! Two years ago this name had not even been born. Today it is making aviation history. In design the Aeronca C-2 is an innovation . . . a radical departure from conventional design. Instead of depending on tremendous power to pull it through the air, aerodynamic efficiency has been increased to the point where its 30 horsepower motor will make the Aeronca duplicate . . . and in many cases surpass . . . the performance of planes with three times as much power.

But, unlike other light planes, speed and maneuverability are combined with remarkable ease of handling and absolute inherent stability, regardless of weather conditions. Though a glider graduate can easily fly an Aeronca after a little instruction, the veteran pilot is even more enthusiastic because his experience enables him to appreciate its outstanding performance.

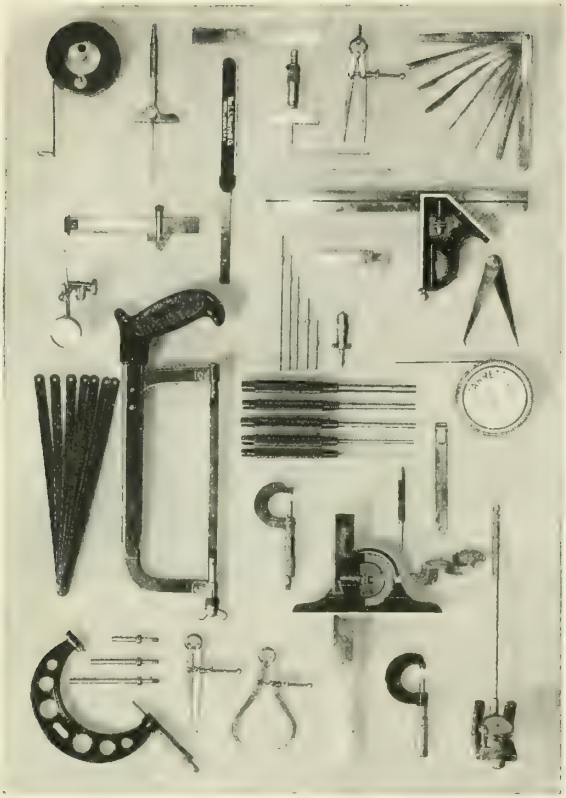
Lieut. Ralph Barnaby, the Navy's glider expert, declared the Aeronca to be the very *next step from a glider* because of its instant response to stick and rudder forces, its seventy-foot take-off and 30 mile an hour landing speed, and its remarkable eleven to one gliding angle.

On the other hand, such famous veterans as Frank Hawks, Clarence Chamberlain, Phil Love, Jimmy Doolittle, Eleanor Smith and others expressed the most genuine enthusiasm for the Aeronca's maneuverability, its rapid climb and the unprecedented feeling of confidence they absorbed . . . no matter what the position of the plane even when very close to the ground.

Compliments from such wide extremes are, alone, a big recommendation. But, to have achieved such a combination of glider safety and sport plane performance in a plane which is much lower in initial cost and *uses only sixty-five cents of fuel an hour* is an accomplishment that is destined to bring aviation to the thousands who could not afford to fly before.

Already some of the country's biggest aviation men can see its huge possibilities. The Issoudun Company, with Major Lamphier and Colonel Breckenridge, have taken over important territories. Russell Nicholas of Nicholas-Beazley is busy in the Mid-west and scores of others are arranging sales franchises. Thousands of letters from real prospects every month indicate the popular appeal and prove that the Aeronca C-2 is what the country has been waiting for—a plane which the average man can fly safely, buy easily and own proudly.

AERONAUTICAL CORPORATION OF AMERICA
LUNKEN AIRPORT . . . . CINCINNATI, OHIO



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(*Continued from preceding page*)

numerous and jovial company, which increased in proportion as we advanced. We soon arrived at a neighboring house."

There he was offered "some excellent potatoes," but because he was too eager to get back to Philadelphia or because the dish was "not to my taste, my stomach rejected these kind proffers."

But he was presented with something which he appreciated from the bottom of his heart. It was another horse, a gentle horse, "a horse not quite so spirited as the first," a horse which ambled along sanely and smoothly, obedient to the slightest touch from his unpracticed hand, "and so we proceeded in company of a great number of horsemen three miles to a tavern, where dinner was prepared for us."

At this tavern he met one Jonathan Penrose, no doubt an ancestor of those Penroses who later played so big a part in Pennsylvania and Philadelphia politics. The admiring Mr. Penrose had, not a horse—praise be the gods!—but a carriage in which he transported Monsieur Blanchard to the banks of the Delaware three miles from the city. And after the crossing, Penrose provided him with another carriage to take him into Philadelphia.

Although it was then half-past six in the evening, the balloonist went at once to the President's mansion to pay his respects to Mr. Washington and "to inform him of the happy effects of the passport he had been pleased to grant me."

The President spoke enthusiastically of what the Frenchman had done for "travel in the air" and expressed the hope that Blanchard would continue to be the pioneer and leader in developing this new science.

"I then had the honor," Blanchard related, "to offer him my colors, which he politely accepted and thereby acquired a fresh claim to my gratitude."

Bruised but happy, reflecting with satisfaction upon the superiority of air travel over the uncertainties, hazards and ungraceful postures inflicted on mankind by badly behaved horses, Monsieur Jean Pierre Blanchard betook himself to his tavern lodgings, receiving the congratulations of the townspeople whom he passed on the way.

He had made history. He had made the first successful air flight on the American continent. He was the hero of Philadelphia and the adored of the ladies. Why should he worry because he lacked horsemanship? Of what value was a horse anyway to a man who soared above the clouds and jarred the stars with his gesticulating hands?

Monsieur Blanchard turned smilingly to the business of ameliorating his horse-given bruises.

CIVIL AVIATION IN SWEDEN

(*Continued from page* 55)

the usefulness of the sport plane as a means of communication.

The Swedish Aviation Society reports most successful activity. It inaugurated and has operated the first civilian flying school in Sweden. In less than seven weeks this school turned out twenty-two full-fledged pilots. During this period its school machines of the Moth type made more than 4,000 take-offs and landings without mishap or damage to plane. The practice was effected on the ice near Stockholm and, when the ice melts, will be completed by hydro maneuvers. The school will then be moved to Gothenburg and Malmö, where summer courses will be held.

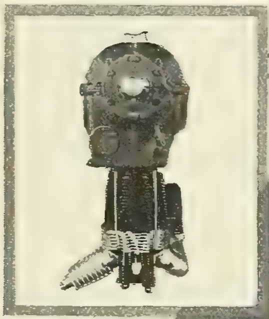
More than in any other country of the globe the aerial

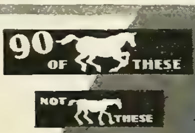
(*Continued on next page*)

The MENASCO PIRATE

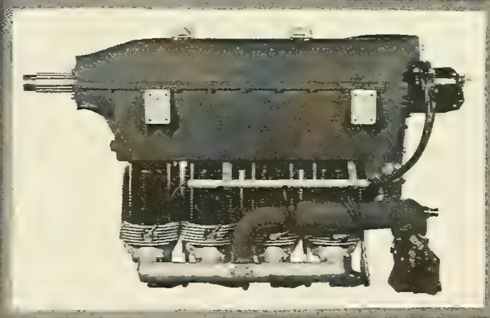
AIRPLANE ENGINE

INVERTED AIR-COOLED FOUR IN LINE





The Menasco "Pirate" has combined exclusive features with the inverted principle which make it the outstanding engine available to the manufacturer of Airplanes.



the "Pirate" was designed for needs of modern aircraft in the 100 HP class.

4 Cylinders in line, inverted; displacement 326 cu. in.; rated horse power full 90 H.P. at 1900 R.P.M.; total weight 270 lbs.; length overall 45½ in.; width overall 12½ in.; height overall 28½ in.; ignition, 2 Scintillas; carburetion, Stromberg; splined crankshaft; ball bearing rocker arms and many other features. Details on request.

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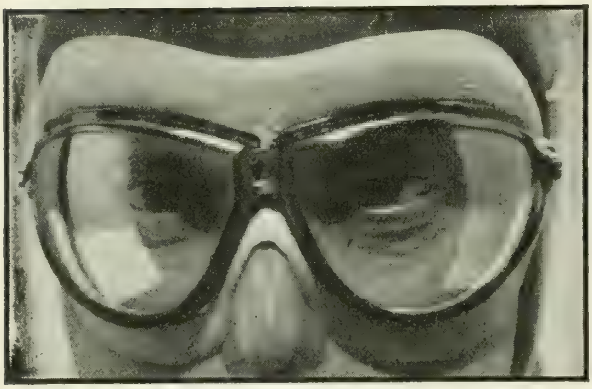
6718 So. McKinley ave. Los Angeles cal.

Perfect comfort

and wide, clear vision

.... SAFETY!



THE WILLSON PILOT GOGGLE

At the end of a prolonged flight, the Willson Pilot Goggle rests as comfortably on your face as when you started. Its sponge rubber vacuum mask is large in area, and light in pressure. It fits every contour of the face perfectly, and the venturi-tube ventilating system creates a partial vacuum to hold the goggle in place. The Willson Pilot Goggle can't blow off, even with wind pressure from the side. Nor can the lenses steam or fog, under flying conditions.

The lenses are meniscus-ground, to assure neutral vision through the entire field of normal eye rotation. Each lens permits horizontal vision of 135°. They are ground with the utmost optical precision, to give perfect unstrained vision, and greatest safety. They are made to U. S. Navy specifications.

The goggle frames are aluminum, enameled dull black like the inside of a camera. In every detail, the Willson Pilot Goggle is of advanced design, and precise durable construction. Yet it is priced no higher than many commercial goggles which do not meet Navy specifications . . . $20.

There is also the Willson Observer, at $10, exceptionally satisfactory in the service for which it is designed. If your dealer cannot supply you with these goggles, write direct to us.

Airports and flying schools find Willson Goggles a popular and successful line. Write for detailed information.

Willson Products, Inc.

Aviation Division

239 Washington Street

READING, PENNSYLVANIA

(*Continued from preceding page*)

ambulance has been developed in Sweden, under the auspices of the Swedish Red Cross, of which Prince Carl, brother of the King, is the president. A new and advanced type of ambulance plane, donated by a private citizen of the capital city, Stockholm, has accommodations for two patients on stretchers and two attendants, besides the pilot and mechanician. It is specially built to withstand the rigors of the Arctic winters and affords its passengers, well or ill, abundant warmth and comfort.

The current flights of the Swedish air ambulances are no longer beset by a difficulty that was encountered by the pilots when the planes were first placed in service. In those days, not only did the pilots have to combat adverse weather and atmospheric disturbances, but they faced the added difficulty that, upon their appearance in the extreme north, the Lapps would run in terror from the "flying witches," taking with them the injured or sick for whom the ambulance had been sent. So, when one of these nomads of the Far North was in need of immediate medical attention, it was half the battle to overcome his superstitious fears in order to transport him safely to the hospital. This unreasonable fright is now eliminated from the hearts and minds of the Lapps, and they enjoy the air voyages to such a degree that they often ask to be transferred home to their tents and reindeer herds by air when they are again fit to leave the shelter of the hospital.

ACCIDENT PUBLICITY

(*Continued from page* 53)

tical matters, it is impossible for them to describe accurately what took place. Yet if those men were to come out and make some statement and if the inspector of the Department of Commerce were to submit a different report because he has some other evidence, once more the Department of Commerce man would be on the defensive against some fellow who, though he may be a totally disinterested witness, knows nothing about the technical side of flying. Because such persons were the only eye witnesses, they think the Department ought to take their story rather than somebody else's explanation. Or it may be they think they should be believed instead of a pilot if he does survive. They will say he is an interested witness, yet the flying men know perfectly well that the men who are most disinterested frequently are the most poorly qualified to give a competent statement.

The Department inspectors ought not to be drawn into a controversy between the so-called eye witness and the technical witness. It seems to me that, although it is clearly a function of the Department to try to stimulate confidence in air travel, when it comes to investigating accidents, there will be better regulations and better administration of the regulations if the Department is permitted to keep findings of its inspectors and the findings of the Crash Board confidential.

Of course, if the Department is going to give publicity to its findings, public hearings must be held, giving everybody a chance to be heard, to examine, and to cross-examine the witnesses. To do that would be an expensive and a long-drawn-out procedure. It would greatly slow up the work of the Department and would tend to get more publicity for these unfortunate occurrences than they would otherwise receive. The newspapers would cover those hearings when controversies arose as to facts. Of course, any controversy of that kind makes news, and instead of helping to get the matter out of the public mind, it would tend to emphasize

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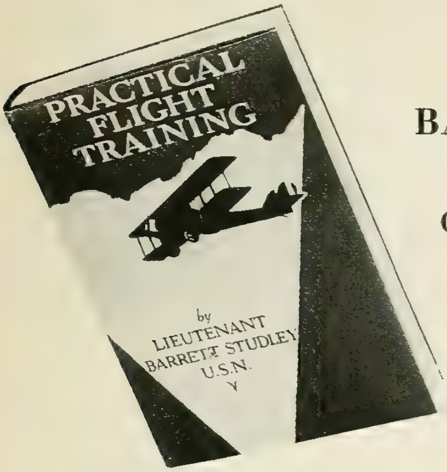
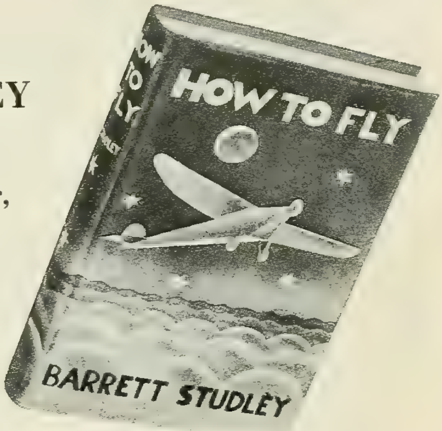
Two Authoritative Books on Flying


PRACTICAL FLIGHT TRAINING
by LIEUTENANT BARRETT STUDLEY U.S.N.

by

LIEUTENANT
BARRETT STUDLEY
U. S. NAVY

**Chief Flight Instructor,
Elementary Training Squadron
Naval Air Station,
Pensacola**



FLYING IS SAFE

But only for the man who knows how to fly safely

The days are gone when learning to fly was a perilous adventure. Modern planes are better and modern engines more dependable. And in modern flight schools, instructors know how to teach students to fly safely.

But there is much for the student to learn. Take-offs, turns, spirals, precision landings, tail spins, stunts, forced landings, cross-country flying—all these he must know intimately.

The man who has studied the maneuvers of flying on the ground is the man who learns them most quickly in the air. He knows exactly what he is trying to do. Therefore he gets full value from every minute of instruction.

Careful Study on the Ground Doubles the Value of Time in the Air

PRACTICAL FLIGHT TRAINING

A technical book for the flight school student

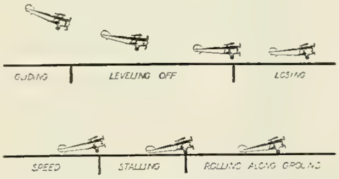
This book is written for the man who is ready to begin flying. It contains everything which an experienced instructor will tell him about the actual handling of the controls in the air.

Some of the chapters cover—aerodynamical principles of flight—personal qualifications for flying—(courses of instruction)—safety precautions—taxying—take-offs—control movements in the air—turns, including slips, skids and how to avoid them—spirals—landings—tail spins and how to keep out of them—stunts—cross-country flying—forced landings, and how to make them safely—(aerial navigation)—the pilot's license.

Both landplanes and seaplanes are included in all chapters.

The only book of its size devoted entirely to the actual handling of an airplane in the air

435 pages 160 illustrations
Price, $5.00



The Stages of a Landing

Lieut. Barrett Studley has had ten years' experience as a Naval Aviator. He is familiar with all types of planes, both landplanes and seaplanes, from slow training craft to fast single-seaters and big multi-motored bombers. He is now Chief Flight Instructor in the elementary training squadron, at the Naval Air Station, Pensacola.

Only competent students qualify in the Navy. Lieut. Studley knows Navy standards and how to train students to meet their rigid requirements. His books are based on the same fundamental principles as the course at Pensacola. And the training methods he describes are those which have been worked out there. Hence his books rest on the authority of practical experience.

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This book covers the same field as "PRACTICAL FLIGHT TRAINING." The fundamental principles of flying and its most important practical problems are fully explained. But it is written in less detailed form. All maneuvers are described in simple, non-technical terms which any one can understand.

The most interesting book yet written on practical flying

291 pages 66 illustrations
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Insist on *American Screws*

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WESTERN DEPOT, 225 WEST RANDOLPH ST. CHICAGO, ILL.

"*Put It Together With Screws*"

(*Continued from preceding page*)

it. More adequate regulations and more effective enforcement will be obtained by permitting the Department to continue its present method of handling accident publicity than by compelling it to make public its findings on each accident.

HEAD WORK IN THE AIR

(*Continued from page* 60)

could get through anything together."

Later it was found the right prop had broken at the hub, as in the Hunter case related earlier. The piece that remained tore the engine out, while the piece that left hit the landing gear strut and glanced over into the left propeller, cutting off five inches from it and causing the vibration that finally forced the landing. When Schroeder sideswiped the landing gear the left motor fell out and rolled along the ground with the ship.

So we find again that a lot can happen to the ship and nothing to the passengers.

Out at San Francisco they will show you where a motor was similarly jerked from a plane and Vance Breese made a nice hillside landing half a mile away, without a passenger being hurt.

Spinning Without a Motor

"THE greatest thrill I ever had," remarks Clyde T Wilbur, modest and business-like pilot for the Belle Fourche Air Lines up in South Dakota, "was wondering if my plane would come out of a spin with the motor gone—and finding it would."

It was October 21 last, when Wilbur got his thrill, and Mrs. W. E. Thompson of Manistique, Mich., "enjoyed" it with him. Mrs. Thompson had been at Pinele, Mont., when she received word of the death of her husband, at Manistique. Consequently, she was hurrying home in Wilbur's plane, stopping overnight at Watertown, S. D., after a late-afternoon start on the 20th. Next day, they were an hour and forty minutes out of Wausau, flying at about 2,000 feet.

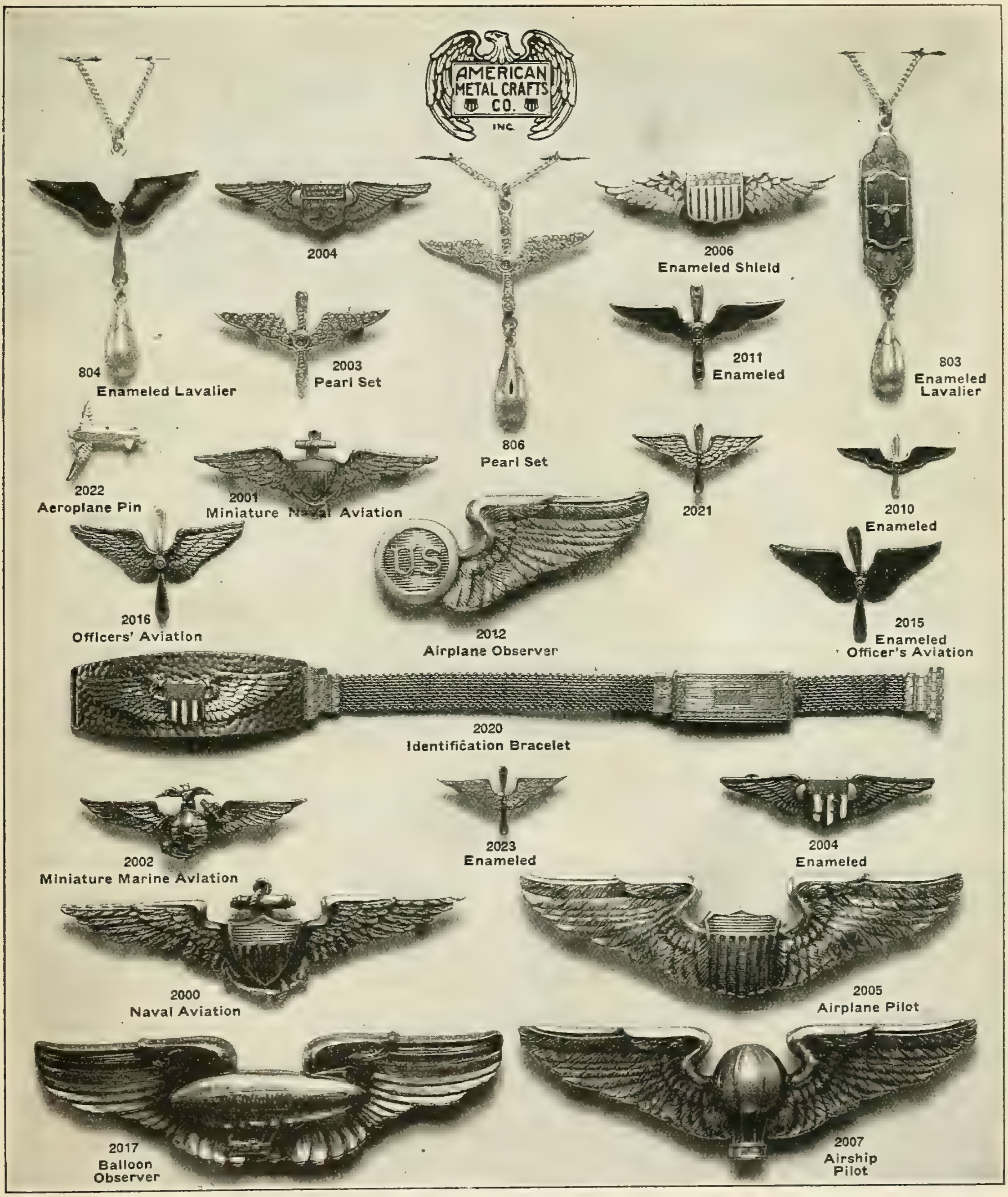
"The air had got very bumpy," said Wilbur, "and we buckled our safety belts. Everything was going nicely, the motor running normally, with the exception of revving up and revving down because of the rough air. All at once terrific vibration set up inside the ship. I shut off the switch and closed the gas lines, as a dense cloud of smoke enveloped the plane. When it cleared away all was quiet, and I think I said, 'My God, Mrs. Thompson, the motor fell out.' Her very calm remark was 'Well, what is to be, will be.' And the fact that she never got more excited than that through the subsequent happenings helped to save our lives."

The subsequent happenings were, first, nosing the ship sharply down and piling the baggage on the instrument board (the plane being very tailheavy), Wilbur tried to stretch the glide to a clearing of about forty acres, a couple of miles away. He couldn't reach it and keep the tail of the ship up, so he started a careful turn to make a smaller clearing directly underneath. But just as the ship got into a normal bank, the tail began to drop, and they went into a left spin. That was when the pilot got his big thrill. Would the plane, without an engine, come out of a spin?

It did, responding to normal control after two complete turns. The pilot had about 500 feet of altitude left, and a choice of but two landing grounds, one a cut-over area with large stumps sticking up, and the other a grove of tall trees. He chose the trees. Much of his flying had been over rough and timbered country, and he had often visual-

(*Continued on next page*)

Attention!! Airports, Transport Companies and Aviation Enthusiasts



Spring is here and with it comes the opportunity for Sales and Profits.

We manufacture a complete line of Novelty Jewelry, mounted with Aviation Insignia as well as Insignia alone. We will also furnish, according to your specifications, any design for Identification, Gift or Souvenir purposes that you may submit.

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DEPENDABLE SCREW PRODUCTS FOR AIRCRAFT CONSTRUCTION

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WESTERN BRANCH AT CHICAGO - 3635 Iron Street

(Continued from preceding page)

ized a tree landing. Now he could try one.

Believe it or not, when the plane landed in a treetop, the impact broke the tree near the ground. It toppled partway over; the plane, says Wilbur, "sort of hung" by the V-type landing gear for an instant, turned quarter-way around to the left and slid down the trunk. The wing took up most of the shock, and pilot and passenger opened the door and stepped out onto the ground, unhurt. They were just 1,000 miles from Belle Fourche, and near enough to the passenger's destination for friends, driving only sixty miles to Escanaba, to hurry her home by auto. With a new wing and engine, the plane was soon back in commission.

Losing a Wheel

NEXT to the missing engine as a departure from routine, the most interesting inspiration for skilful pilots is the missing wheel. The history of flying is fairly full of them, and nearly always the pilot does his stuff as if one wheel were just as good as two.

Perhaps freshest in the memory of readers of AERO DIGEST, and of the newspapers, will be the excellent landing made by Clarence Chamberlin in 1927 when he was taking Charles A. Levine's nine-year-old daughter Eloyse for a ride after she had christened the New York to Berlin ship, *Columbia*. With them were Grace Jonas, fifteen-year-old daughter of Ralph Jonas, president of the Brooklyn Chamber of Commerce, and John Carisi, who had superintended all the mechanical arrangements for the Berlin jaunt.

The *Columbia* hadn't actually lost a wheel, but a sheared-off pin in the left shock absorber let the front strut drop out of its fuselage fitting, causing the left wheel to sag in under the body. The left side of the landing gear was useless.

Chamberlin caught signals from the ground to show that something was wrong. Dean Smith also borrowed a Curtiss Oriole and went up alongside, with a mechanic displaying an extra wheel. The *Columbia* was carrying a lot of tail ballast, in the shape of bags of sand, which Carisi threw out, and all prepared for a rough landing. But when Chamberlin set her down on three points—tail skid, right wheel, and right wing tip, she ground looped slightly to the right, and then to the left as the unsupporting left wheel came up, cracked the left wing strut, and let the left wing tip down. Everyone was alright, with the girls rather disappointed that there wasn't more of a crash.

Captain Duncan Thrills 'Em

ALL who were there remember Captain E. W. Duncan's one-wheel landing that climaxed the Pulitzer race meeting in New York in 1925. It was October 13, the last day of a meeting that began on the 8th and was prolonged by much bad weather. And everyone saw the Duncan feat who, like myself, in those years stayed with a Pulitzer meeting until the last plane was out of the air—which in this case was Captain Duncan's. The Captain is now Air Officer for the Sixth Corps Area, and when I was stormbound with him recently at the South Bend airport, we talked over the incident.

Wiping off a wheel on a telephone pole as his plane got into the backwash of another in the close quarters near a pylon, Duncan was soon being warned by Lieut. Barksdale from the police ship, while ambulance and fire wagon were run out onto the field to help pick up the pieces and put out the fire when the Captain landed. But after every other ship was in, Captain Duncan gave the meet the proper finish by landing perfectly balanced on his remaining wheel, roll-

(Continued on next page)

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Unusual Facilities—At Lincoln you have the advantage of more than $250,000 worth of buildings and equipment. A modern $100,000 airport. Government licensed pilots, mechanics and airplanes.

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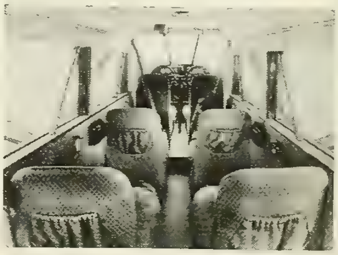
We Offer Part Time Employment to students to help defray expenses while in training.

Get Started Now—Aviation continues to grow faster and faster. It offers the world's greatest opportunity. Come to Lincoln. Mail coupon for full information today!

Attention! — Airports Factories — Schools

We make a business of assisting airports, factories and schools in getting in touch with licensed mechanics, pilots, mechanics' assistants or ground and pilot instructors. Write us your needs. No charge for this service.



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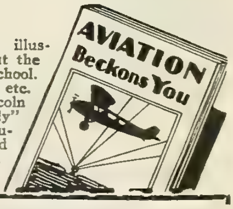

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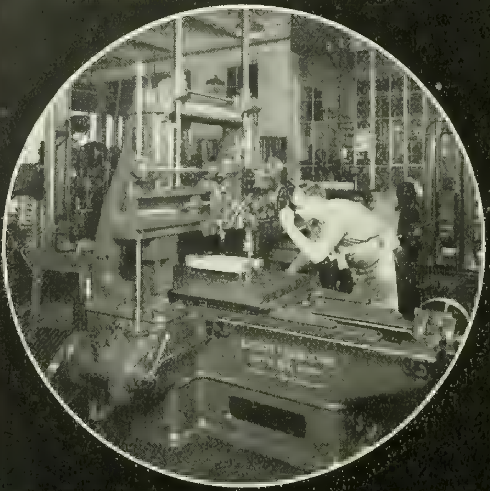
PRECISION PARTS



The Part Is No More Accurate Than the Tool

ONLY precise tools can produce precise parts. That is why Govro-Nelson designs and builds complete in its own shops, all jigs and fixtures used in the manufacture of aircraft parts. To further assure the necessary accuracy, Govro-Nelson designs and builds the most precise inspection gauges that constantly check the exactness of the machines and their products.

The machine pictured above is a Zip Swiss Jig Borer, recently imported from Switzerland by Govro-Nelson. It produces jigs and fixtures with extreme accuracy.

GOVRO NELSON COMPANY
1931 ANTOINETTE-DETROIT

(*Continued from preceding page*)

ing on it a hundred yards, and sliding to an easy stop as the wheel gave way when the ground speed of the crippled plane was almost nil. Nothing doing for ambulance or fire wagon.

Nowadays it is a rather new field that hasn't had its one-wheel landing. Paul B. Shaw of Iowa City made one the other day, with a student, Ira Stover, in the cockpit. On our home field at Davenport, Manager Larry M. Pedigo made one last summer, after a wheel twisted off in a rut as he took off with a passenger. Since then the rut has been eliminated. Colonel Charles A. Lindbergh, of course, made one with Mrs. Lindbergh as his passenger—just to make it a perfect score for the flying Colonel. No need to worry any more when a wheel is reported missing—just so the pilot knows it is gone.

When Streett and Stevens Couldn't Come Down

STRANDED seven miles in air, and unable to come down until they ran out of gas, Captain St. Clair Streett and Captain Albert W. Stevens are living proof of the fact that the plane doesn't fall when trouble starts. For them it started when they were 37,854 feet above Wright Field, Dayton, Ohio, October 10, 1928, the highest altitude ever attained by an airplane with more than one occupant. When the intense cold, seventy-six degrees below zero, shrunk the metal parts of the plane, Captain Streett found the throttle wouldn't work when he tried to shut off the gas and descend. Diving with power on might rip off the wings, so the stranded airmen cruised around for twenty-four minutes before the decreasing gas supply let them glide to lower altitudes and finally to land. Having given all his attention to his controls, Captain Street then found they were near Indianapolis and seventy miles from home.

When the Balloon Blows Up!

IN quite another class, and delightfully different, was the experience of Ralph Upson and C. G. Andrus, balloonist and weather shark, as a result of which they didn't win the James Gordon Bennett cup in the free balloon race for that trophy, a few years ago.

It was around midnight when their balloon burst at 5,000 feet, because an experimental valve failed to work when warmth expanded the gas in the big bag as they drifted south. Upson and Andrus had discussed every possible contingency, including that one. So a knife nearby was seized, and the proper ropes were cut to collapse the silk bag in the top of the rigging, forming an immense if extemporized parachute. Basket, ballast and two men, and an oxygen tank, however, made so much weight that they were plainly descending about four times as fast as was comfortable. Over the side went sand bags as fast as they could be tossed out. Then over went the oxygen tank. That 5,000 feet of altitude saved their lives, for ultimately they landed with just a good bump, right in the L of a farmhouse on a Southern plantation.

So far, so good; no tragedy; and real comedy followed! For this particular family had been bothered by Ku Kluxers. When the planter and his family heard things falling around the place in the stillness of the night, they thought the K.K.K.'s were after them via the air route. With dull detonations, sand bags were falling here and there over the plantation. Aloft a voice broke the still night: "Shall I throw this out?" And down came the oxygen tank.

The result: When Upson and Andrus landed they found a locked house. After long delay the farmer unbolted the

(*Continued on next page*)

Hold On, Mister! What About *WEATHER-GROUCH* At Your Flying School?

"When I go to flying school I want to FLY. Not once every week or two but **every day!** Now—how about your weather?" If every student asked this blunt question before enrolling for flying training there would be less weather-grouch around muddy flying-fields. Weather-grouch costs MONEY when you're in flying training. Search the weather records of America—where do flying conditions most nearly approach the ideal? In TEXAS—the region around Dallas. It's ALWAYS flying weather here.

That is why America centered its war-time training here. That is why we chose Dallas as the home of the **best flying school in America.**

That's absolutely the plain unvarnished truth. Judged by any standard except size, this school will lead the country. We are not striving for bigness. We can give our students closer personal training as we are.

This school has known many of America's best known aviators—the older ones as instructors and the new generation as students. We develop REAL fliers. Just as Love Field is one of the oldest and best known training centers, so our training is known and recognized from coast to coast. Our students come from every state in the Union.

Ideal flying weather is only one of your great advantages in training here. We will not only graduate you in record time, but you will fly up-to-date, perfectly conditioned ships; you will be instructed by master pilots and ground teachers, and you will live amid conditions that will please you better and cost you less than any other school. That is a FACT! We have proved it time and time again to the full satisfaction of prospective students.

But do not take our word for it. Drop the following coupon in the mail and we will send you testimonials—references—complete information about the pleasantest, most interesting and most profitable training school ever established for young American men and women.

Tune in Radio Station WFAA any Monday Evening at 6:45, Central Standard Time.

Our Courses:

PRIVATE PILOT'S COURSE—20 air hours—$385—takes about four **weeks.** Ground school course included. Qualifies you for private pilot's license.

COMMERCIAL COURSE—50 air hours—$795. Everything in flying. Cross country trips, acrobatics, night flying. Open and cabin ships. This is the big, popular course.

TRANSPORT COURSE—200 air hours—$2500. Qualifies you for transport license. Position guaranteed as soon as license is secured. Cost of this course will soon be increased $500.

SPECIAL COURSES at $100 to $250.

More For Your Money— For Less Money!

Dallas is a clean, modern, wide-awake city of over 300,000. No lack of things to do!

Love Field was built for war-time army training at a cost of $2,000,000. It is one of America's best and **busiest airports.** Dallas Flying School students enjoy all the field's contacts.

We have government licenses for all instructors, ships and mechanics.

There are 50,000 square feet of hangar, shop and classroom space at Dallas Aviation School.

Our students live at the airport hotel, in the school dormitories or with private families. Room and board from $10 per week up.

We will pay your railroad fare from your home to Dallas if you enroll for either a transport or commercial course: one-half railroad fare if you enroll for private pilot's course.

DALLAS AVIATION SCHOOL
LOVE FIELD, DALLAS, TEXAS

Send me particulars. I am interested in .... *Course.*

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Will You See It In Time?

Roy Ahearn, Red Wing Flying Service, carried 28,000 people in 1929 without an accident.

Why Fly "In the Dark" In the Day?

If flying straight toward the sun, or if that radio mast, church spire, tank or transmission line tower is against a bright sky, will you see it in time? Do you fly blinded half the time with inaccurate or deceptive vision? Have a clear accurate vision ahead whatever the angle. Keep your eyes clear and free from blurred or frosted goggles. Fly with eye ease—comfort. No eye strain or "goggle headache" with—

American Transport Goggles

Blurproof

Glareproof (with Calobar)

Tested, approved and adopted by the U. S. War Dept. Air Corps, made by the American Optical Co., world's largest optical organization. In a 27,000-ft. altitude test they didn't fog, though 32° below. No air leaks. Ventilated—clear and transparent always. Decentered lenses.

"It's a pleasure to wear them and that's saying a lot for any goggles," wrote a pilot. AMERICAN TRANSPORTS fit any face—light—comfortable—instantly adjustable—serviceable for years. With clear white lenses, $20. With Calobar lenses, $24. (Calobar lenses are glare-proof. One may fly straight toward the sun. Ultra-violet and infra-red rays excluded but color values not altered. Objects ahead always clear even against a bright sky.) Order a pair today—or send for more information. Special discounts to dealers and schools.

Satisfaction —or Money Back

As fliers, we know you'll be pleased, but want you to feel that you will, and have no risk. So buy 'em—fly 'em—try 'em. If you are not satisfied, your money back pronto.

All parts adjustable and replaceable without tools.

Sign and Clip Mail the Slip

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Enclosed
☐ $24 Send prepaid Calobar lenses
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☐ Send more information.
Name ....
Address ....

(*Continued from preceding page*)

doors and let them in, but the woman and children remained hidden in the cornfield for several hours, believing the farmer's calls to them that everything was all right were made under duress to lure them from their hiding. If I could tell it as well as Andrus does, you would vote it the best story you ever heard.

The old rule had held—the higher the safer—and that 5,000 feet gave two cool-headed balloonists plenty of time to fix things for an easy landing.

Weather Hazards

STORIES might be added indefinitely, of happy landings under difficulties—or after major hazards had been overcome. Finishing the 1927 National Air Tour in a rain, wind and electric storm, those of us who were passengers in the Navy Ford plane looked down from 2,000 feet on two farms, not far apart, where all the buildings were being consumed by flames started by the jagged darts of lightning that passed us by to find their targets on the earth. All thirteen planes left in the Tour made safe landings on Ford Airport, and they do say the Navy pilots of our big trimotor made the prettiest landing there of the whole trip.

The Seaworthy Seaplanes

THE sea has stories aplenty to show that all is not over when the gas runs out.

As long ago as 1925, you remember, they were hunting Commander John Rodgers and his gallant crew of the PN-9, after they fell short of reaching Hawaii, the goal of their Pacific flight. Eight days afterward the PN-9 taxied up to the Island of Jaui, self-discovered and self-rescued, after the world had had over a week of needless worry.

Then there was that Italian, Locatelli, who persisted in wanting to fly across the Atlantic with our own World Cruisers. He was down on the ocean three days and nights, when—at midnight—a sailor on the *Richmond* caught the faint flicker of an electric torch on the floating Dornier Wal, and Locatelli, his assistant pilot and two mechanics were ready to sleep in beds again.

Commander de Pinedo showed how seaworthy the Italian planes are when he took to the water on his way to the Azores, year before last. He was quite comfortable when searchers found him.

It's a fascinating subject, I find, this combination of airwork and headwork. One reason we don't see more such stories in print is that really good head work is making them scarcer. An observer with years of experience in flying points out to me that, in a corps of first-class pilots such as are found in the military services and with large transport lines, one seldom hears of good head work on the part of the pilots. The reason for this is that the good head work they do display is on tap continuously and takes the shape of keeping the mind active to avoid predicaments where sudden decisions are necessary.

The best pilot seldom lets himself be caught napping, he plans so far ahead, and through his experience he can foresee many hazards in the distance and the manner in which those hazards may be avoided, so his name is seldom heralded as that of a man who has done some wonderful piece of head work. In fact, transport companies frown on the pilot who is continually pulling himself out of tight places. They prefer pilots who avoid those places.

So the airline passenger may climb aboard, quite confident that his pilot is not going to get into an aerial pinch if it can be avoided, as it usually can. And he may also be

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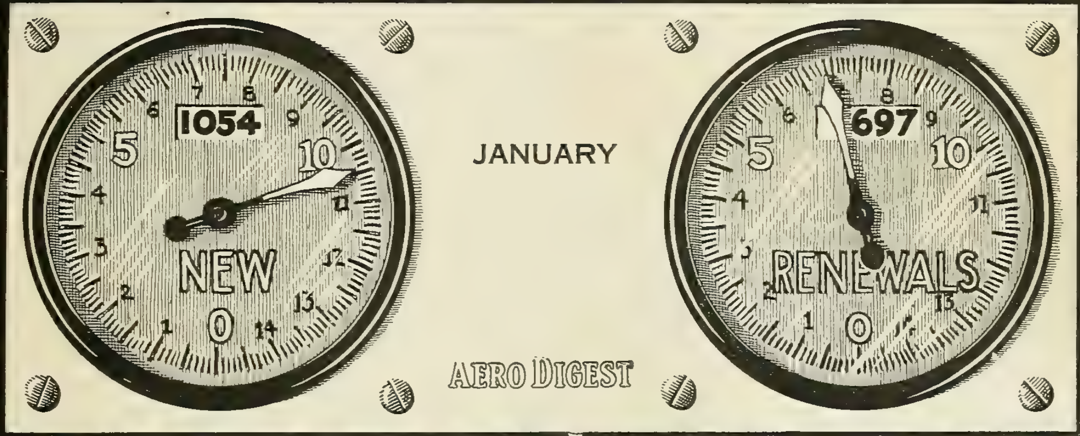

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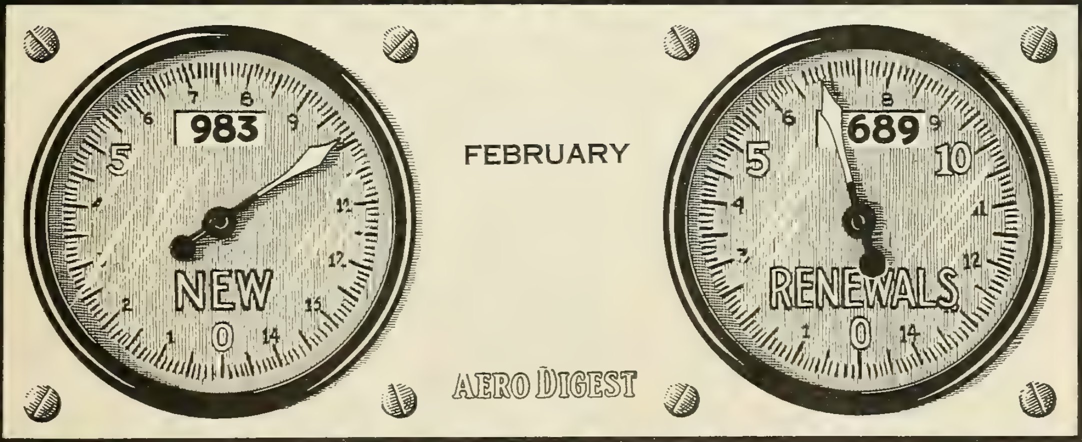

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New STANDARD Says

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February 11th 1930

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LOS ANGELES

(*Continued from preceding page*)

composed if something goes wrong mechanically, knowing that good head work stands between him and any possible hazard, quite capable of landing the plane if the engine falls out, the wheels fall off, or if there are other deviations from the schedule of flight.

Leave It To The Pilot.

STATUS OF AIRLINE OPERATION

(*Continued from page 57*)

effectively to bring the advantages of airplane transportation in all its phases to every section of the country.

The volume of business which may be expected at the costs necessary to sustain a fully equipped, properly operated airline will eventually determine the extent of the network and the frequency of schedules. It is in this matter of costs that the airline operators can best serve the ultimate purpose behind the Government's willingness to bear the initial burden.

Present costs are excessively high for a multiplicity of reasons. Initial cost of equipment will be materially reduced when the equipment needs of the industry reach a status permitting of continuous, programmed production. Actual flying costs may be reduced by development of more efficient power plants; but they can be brought down now by greater utility of equipment, by keeping the airplanes more hours in the air and less in shops and hangars. Encouragement of passenger traffic will be stimulated by proper terminal facilities, depots, rest rooms, dustless airports and other conveniences; by on-time departures (weather permitting), and certainly by reducing fares with each reduction in cost.

The effect that rates have on passenger patronage has been strikingly demonstrated within the past few weeks. In mid-December passenger rates on one line were brought to the level of rail fare plus Pullman. Volume multiplied several hundred per cent overnight. Other lines followed suit until by early January air tariffs were generally below the rail plus Pullman level, with the uniform result that during the present winter, despite schedule cancellations for weather and the formerly popular notion—still prevalent in Europe—that people would not fly during the stormy season, the airlines of America have enjoyed the heaviest patronage of their history.

The rates charged, of course, are below cost of operation. There is no airplane now in use that can be properly maintained and operated over an equipped airway at a cost of five cents per passenger mile. But that rate, or near it, is the level which for the present at least the traveling public is willing to pay. It is up to the operators of airlines to develop and put in use equipment that can show a profit at something less than that rate. Then, maintaining schedules regardless of load, they can hope to attract traffic in profitable volume.

And we are certain to do this. Maybe not this year, nor next, but eventually, if we can just secure revenues sufficient to keep going and to finance improvements, the airplane will be, not only the fastest and safest method, but also the cheapest ever devised by man for the transportation of himself and his goods. Evidence of the truth of this assertion is to be found in equipment development during the four years of commercial aviation in this country. Whereas in 1926 it cost approximately forty dollars to fly two passengers one hundred miles; in 1927 it cost ninety dollars to fly eight passengers one hundred miles; by 1928 it was costing only one hundred dollars to fly twelve pas-

(*Continued on next page*)

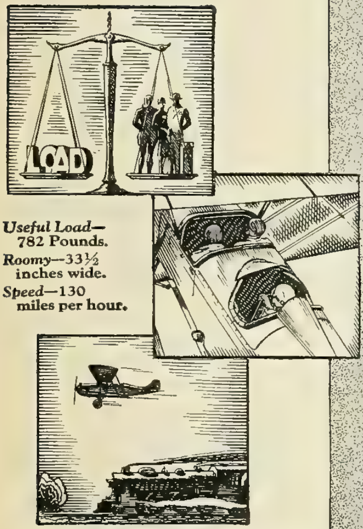
» A GREATER AMERICAN EAGLE LINE THAN EVER BEFORE

BECAUSE of its noteworthy ability to build dependable, rugged and speedy airplanes — and its desire to not only keep abreast of the times, but to lead in advancing new designs—new factors of comfort and safety, American Eagle Airplanes have become leaders in the Aeronautical industry.

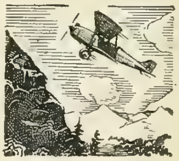
And now American Eagle introduces the 201 Biplane, with Kinner power (shown below)—setting a new standard in flyability and giving performance which is a year ahead of the times.

Its ability to travel 130 miles an hour at full throttle with a full load and to cruise at 115 miles an hour with the same load makes it a plane which will be in great demand. The American Eagle 201 takes off in 75 feet and lands at 30 miles an hour with full load. It climbs 750 feet the first minute, fully loaded. The wing curve used gives a high lift characteristic and surprisingly high speed.

A new roominess in the cockpit—a new beauty of design—new factors of safety and comfort—all of these and many other important refinements mark this plane as one of the outstanding achievements in aircraft construction.

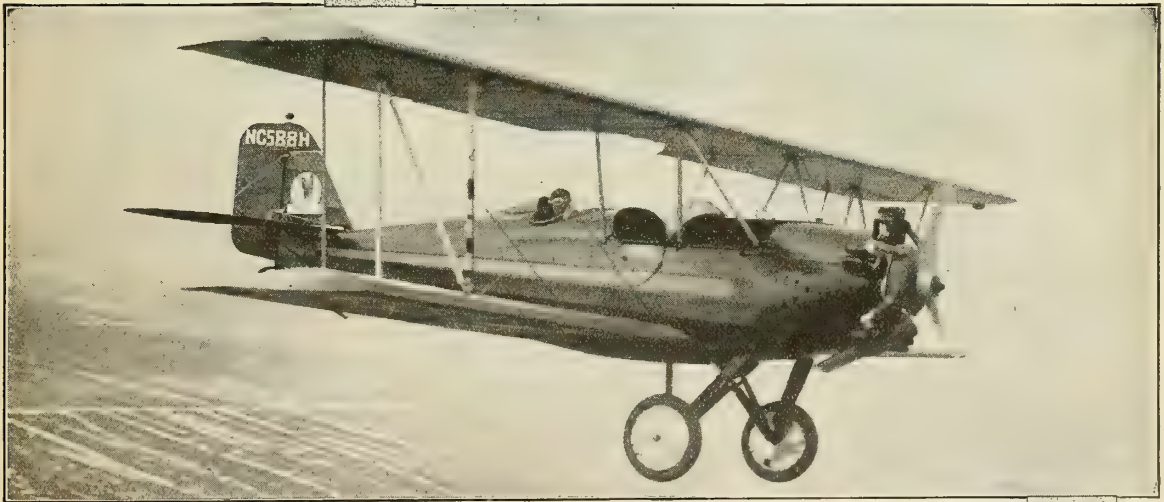


Useful Load—782 Pounds.
Roomy—33½ inches wide.
Speed—130 miles per hour.



Rate of Climb—610 feet per minute.

AMERICAN EAGLE AIRCRAFT CORP.
FAIRFAX AIRPORT KANSAS CITY, KANS.



FREE FLYING LESSONS . . . .

A short time ago American Eagle announced flight instruction would be offered FREE to a limited number of purchasers of American Eagle airplanes at retail. Naturally such a liberal offer must be limited, however, the time limit has again been extended because of the large number of requests which have come in for reservatoins. Write or wire today for full information.

"Learn to Fly in a Glider"
says Captain Frank Hawks

Here is what Captain Frank Hawks says about gliding: "First, it teaches the basic principles of flight correctly. Secondly, it is safe. And third, it is a great sport."

Why not form a glider club so you and your friends can learn the fundamentals of flying? The Detroit Gull—built by Gliders, Inc., pioneer manufacturers of motorless aircraft in the United States, offers a proved primary type ship, ideally designed for students of gliding.

Group ownership of a Detroit Gull is inexpensive—the initial cost is low and the upkeep practically nothing.

The DETROIT GULL $485 with safety belt

We cordially invite you to write for glider club information and for our illustrated folder on the Detroit Gull.

GLIDERS INC., Division of

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RYAN AIRCRAFT CORPORATION
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PARKS AIRCRAFT CORPORATION
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BLACKBURN AIRCRAFT CORPORATION
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GROSSE ILE AIRPORT INCORPORATED
GLIDERS, INCORPORATED
AIRCRAFT PARTS COMPANY INCORPORATED
DETROIT AIRCRAFT EXPORT CORPORATION

UNION TRUST BUILDING, DETROIT
CHANIN BLDG., NEW YORK – ROOSEVELT BLDG., LOS ANGELES

(*Continued from preceding page*)

sengers one hundred miles, and equipment that will be in the air before this article appears in print will carry thirty passengers one hundred miles at an estimated cost of one hundred and twenty dollars. That is, the reduction has been from twenty cents per passenger mile to four cents per passenger mile (based on full loads) in less than four years.

The next step will, no doubt, be much longer in arriving but that it will come is certain. Meanwhile, the industry can well afford to look to the possibilities of effecting economies with the equipment now available, a process which should within the next few years bring airplane transportation into its own.

For the present and for the immediate future, having in mind the enormous public benefit to result from a systematized, articulated, comprehensive air transport, the Government can well afford to nourish this latest infant. Particularly so in view of the enormous return in time and money saved already being earned by those citizens who use the air mail in the transaction of business. With this help and by intelligent application of their own efforts, members of the airplane transportation industry should face the future without fear.

SPEED AND ALTITUDE RECORDS

(*Continued from page 81*)

lighthouse in Long Island Sound, off Sands Point, L. I. Unfortunately, I had a cross wind. I broke the record with 132 miles an hour, but this was not officially recognized because the rules of the Federation Aeronautique Internationale require that a speed record be broken by at least five miles an hour. The existing record was 130.1 miles an hour. The holder of the record wa Richard Wagner, who on January 20, 1928, at Friedrichshafen, Germany, flew his Dornier Super-Wal with four Gnome Jupiter 480-horsepower engines faster than any seaplane with that load ever had been flown before over a 100-kilometer course.

Although I did not officially break the world's record on this attempt, I exceeded the American record, 92.53 miles an hour, made July 8, 1927, by Lieuts. B. J. Connell and S. R. Pope in a PN-10 with two Packard 600-horsepower engines.

A week later I returned to attempt the record again. Townend rings had been placed around the engines, and some of the struts had been streamlined, otherwise, the ship was not altered. Even the pitch of the propellers was not altered.

I took off from North Beach and flew to Fairfield, then dove down over the line after the manner permitted by the rules of the F.A.I., and revved up my engines to about 2,000 revolutions per minute. The ship seemed to jump through the air. Almost before I knew it I was in a steep bank and rounding Execution Light, and in twenty-five minutes and fifty-eight seconds I flashed over the line at Fairfield. My time was officially checked by Mr. Christopher at 143.7 miles an hour, beating the old record by almost fourteen miles, automatically establishing this as a new record.

The same afternoon I took off again from North Beach with a dead load of 1,000 kilograms (2,204.62 pounds). I sought to exceed the record for seaplane altitude with that load held by Franz Kneer, who on November 7, 1928, flew his Junkers W.34, with a Bristol Jupiter 420-horsepower engine, to a height of 20,961 feet.

At 12,000 feet my altimeter, which had been badly

(*Continued on next page*)

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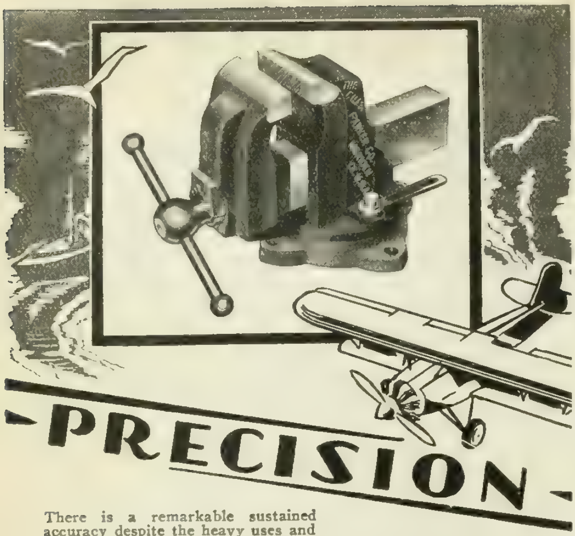

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(*Continued from preceding page*)

shaken up in the previous speed test, stopped functioning. I continued climbing and when, as I believed, I was about 18,000 feet up, I made use of my oxygen apparatus, for breathing was becoming difficult. I continued to climb until I estimated I had gone over 23,000 feet. At this altitude my rate of climb was hardly measurable. The total time elapsed in climbing was about an hour and forty minutes.

(As we go to press, the Bureau of Standards has not announced the official altitude of this flight.—Ed.)

Another record which our engineering department figured this plane should exceed was the speed record for seaplanes with a load of 2,000 kilograms over a 500-kilometer course, now held by Richard Wagner of Germany with a Dornier Super-Wal at 111.48 miles an hour.

The normal cruising speed of an S-38 is 111 miles an hour. Since I had heard a rumor that a French pilot recently made 126 miles an hour in a seaplane loaded with 2,000 kilograms, I was intent on doing better than 131 miles an hour. The first attempt was made on March 14. I was not ready to start until 5 o'clock. After three laps I was forced to abandon the attempt because part of the engine cowling became detached. At that time I had made approximately 200 miles at the rate of 142 miles an hour.

Before this account is in print I hope to have added this record to the others and also one or two more. I do not think I exaggerate in saying that the Sikorsky S-38 has clearly demonstrated its unusual capacities for speed and altitude flying with a heavy load.

Among many interesting facts brought out by these tests, we gound that a 15½-degree setting of the propellers' blades was equally efficient for both speed and climb.

ALL-AMERICAN AIRCRAFT SHOW

(*Continued from page 73*)

formance of the Curtiss Tanager, and design and engineering in glider construction. The Detroit Section of the Society of Automotive Engineers will sponsor a banquet at the Book-Cadillac Hotel on the evening of April 8. The members attending the session will make a bus trip to the municipal airport on April 9 to attend the glider demonstration which the society will sponsor; and will make a trip by bus to the airplane factory and museum of the Ford Motor Company at the Ford Airport on April 10.

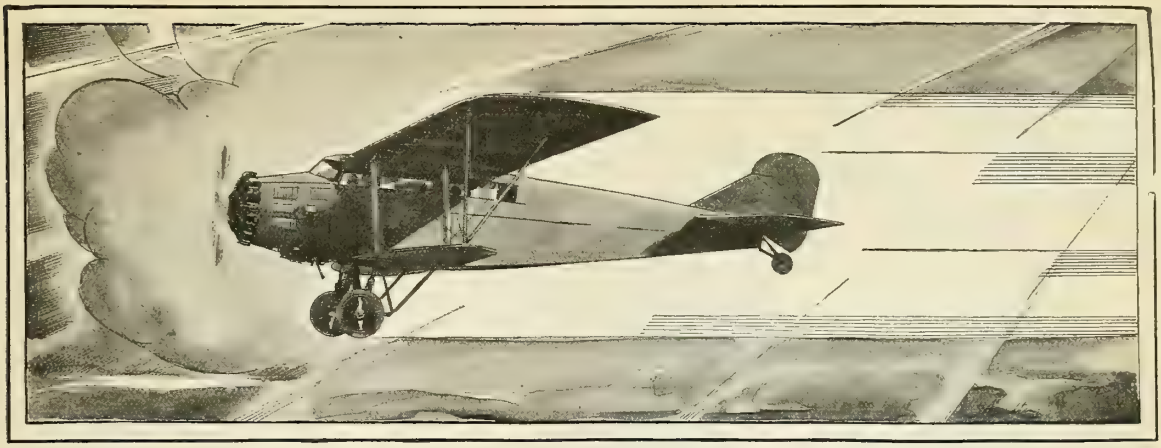
Ray Cooper, manager of the third annual All-American Aircraft Show, is secretary of the aircraft bureau of the Detroit Board of Commerce; and Edward S. Evans, chairman of the show committee, is president of the board of commerce aircraft bureau and president of the Detroit Aircraft Corporation. The members of the show committee include the following: William E. Metzger, vice chairman; Harvey Campbell, secretary; and William B. Mayo, Frank W. Blair, Charles T. Bush, D. Dwight Douglas, Harold E. Emmons, W. Magruder Jones, Thomas C. Merrill, G. Hall Roosevelt, William Robert Wilson, Norman B. Conger, Griffith Ogden Ellis, Harry R. Graham, Eugene W. Lewis, Phelps Newberry, Sidney D. Walton, and Capt. L. M. Woolson.

SYSTEM IN THE INDUSTRY

(*Continued from page 52*)

Aside from the tabulation of reports, the department is responsible for the actual activity of flying the scheduled and special trips, and has worked out a system that operates with clock-like precision. By the company's own shortwave radio, every departure and arrival, together with the

(*Continued on next page*)



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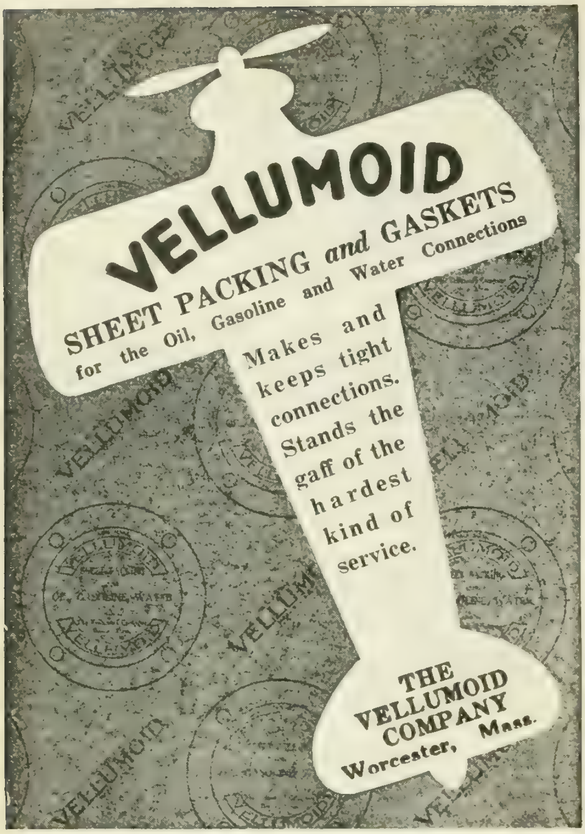
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(Continued from preceding page)

pilot's name, passengers, ship number and destination, is dispatched immediately to the central operations office; and every ship is accounted for before the office closes in the evening.

The movement of ships is graphically represented on an operations board on which placques, bearing the name of the pilot and the number of the ship, are moved. The movements follow the flight of the ship, so that at a glance the operations manager can determine the location of each ship.

Safety in flight for these ships is insured by an adequate reporting service. Information from stations over the whole system is collected at a central point by the company's own short-wave radio system, and disseminated again over the entire system. Before the departure of each ship, last minute information concerning the state of weather along its route is secured.

Parts Department

Probably no more drastic change has been effected anywhere in the industry since the day of the barnstormer than in that of aeromotive maintenance and repair. The old flier tinkered around his plane with such tools and such knowledge as he possessed until the ship would fly again. Today engine and plane overhaul is a complex but thoroughly systematized business.

The following account of the procedure of the parts department summarizes the system employed:

Job Record Sheet. When the job is taken, the foreman of the shop prepares the "Job Record." The Job Record is prepared in triplicate, the original copy being sent to the main office as soon as the job is taken. The duplicate copy is sent to the stock room, where parts and labor are recorded on it. The triplicate is given to the mechanic who is assigned to that particular job.

Time Card. The mechanic records his time on separate "Time Cards" for each particular job by stamping this card on the time clock. The time is stamped in when the work is begun and stamped out when the job is completed. These Time Cards are prepared to the front side of a duplicate copy of a Job Record sheet, which is the property of the stock room manager.

Mechanic's Requisition. Each time the mechanic desires parts for the job to which he has been assigned, he obtains a "Mechanic's Requisition" from the foreman, properly signed, and presents it at the stock room window, where he obtains the parts which he desires. These Mechanic's Requisitions are posted to the reverse side of the duplicate copy of the Job Record. The Mechanic's Requisitions are also posted to the "Perpetual Inventory Card" which is kept in the stock room.

The Daily Time Cards and the Mechanic's Requisitions are sent to the main office daily. A separate folder is prepared for each job, and all Time Cards and Mechanic's Requisitions are posted to the original copy of the Job Record sheet. The Mechanic's Requisitions are also posted to the "Master Perpetual Inventory" in the main office.

Cost System. At the time the Mechanic's Requisitions are posted to the Perpetual Inventory, each separate part is costed. The cost clerk then enters the total cost of each requisition on the reverse side of the original copy of the Job Record. The mechanic's Daily Time Card is also costed, on the basis of a 216-hour month divided into the total salary of each mechanic. Therefore, since all Time Cards and Mechanic's Requisitions are posted to the Job Record Sheet, the total cost is obtained.

The Job Record Sheet is then passed to the sales ticket clerk who checks the time and parts expended against the

(Continued on next page)

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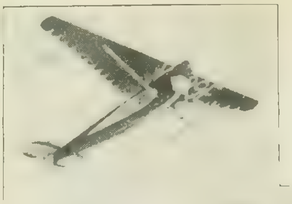

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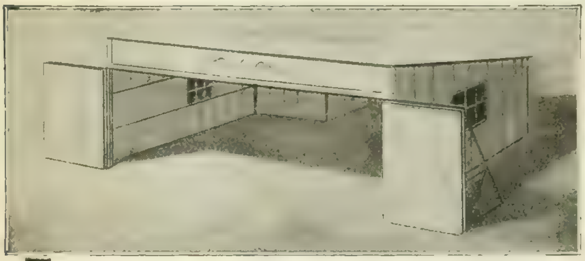

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(*Continued from preceding page*)

duplicate copy of the Job Record Sheet which is sent in by the stock man at the completion of the job. The total cost is then entered on the sales recap journal. At the end of the month this sales recap journal is posted to the general ledger accounts in the accounting office.

Branch Requisition. When the stock man at any of the division points desires parts, he requisitions for these parts on a "Branch Requisition." The Branch Requisition is prepared in duplicate, the original being sent to the main office and the duplicate being retained as a record of the parts ordered at the division point.

When this Requisition is received, the shipping clerk then sends all parts which he has on record at the warehouse to the division point.

Stock Transfer Order. These parts which are shown on the Branch Requisition are recorded on "Shipping Order" and sent to the warehouse. The warehouse manager then prepares the "Stock Transfer Order." The Stock Transfer Order is prepared in quadruplet, the original being sent to the main office as soon as the goods are shipped. The duplicate and quadruplet are packed with the shipment and are received by the stock clerk at the division point. The triplicate is retained by the warehouse manager.

The warehouse manager then posts the parts sent to the Perpetual Inventory cards. The division stock room manager checks the shipment when he receives it and returns the duplicate copy to the main office, properly entering all parts which he received on his Perpetual Inventory cards.

The original and duplicate copies of the Stock Transfer Order are checked against each other in the main office and entered on the Master Perpetual Inventory cards.

Requisition on Purchasing Agent. When the shipping clerk is not able to furnish all parts on the Branch Requisition, he prepares the "Requisition on the Purchasing Agent," ordering the parts which he desires.

Purchase Orders. The "Purchase Order" is prepared by the purchasing department, two copies being sent to the parts department attached to a copy of the Requisition on the Purchasing Agent. One copy of the Purchase Order, with the Requisition on the Purchasing Agent, is sent to the division for which the parts are ordered. The second copy is retained in the parts department until the goods are received.

Receiving Report. When the order is received at the division point, the goods are properly checked and a "Receiving Report" prepared. The Receiving Report is prepared in triplicate, the original and duplicate being sent to the main office attached to the Purchase Order and the triplicate being retained as a record at the division point. The parts which have been received on the Purchase Order are then entered on the Perpetual Inventory cards at the division point.

The Purchase Order and the two copies of the Receiving Report are then sent to the main office, where the parts shown on the Receiving Report are recorded on the Master Perpetual Inventory cards.

The Purchase Order is then stamped and passed to the purchasing department, which attaches the invoice and sends the Purchase Order and Invoice to the accounting department, which immediately pays the account.

Back Order. When all the items shown on the Purchase Order are not received, a "Back Order" form is prepared. The Back Order is prepared in duplicate, the original being sent to the main office attached to the Purchase Order and Receiving Report, the duplicate copy being retained to be used as a Purchase Order when the remainder of the goods

(*Continued on next page*)

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(*Continued from preceding page*)

are received.

Sales Ticket. When a sale is made at any of the division points a "Sales Ticket" is prepared in quadruplet. The original is sent to the main office, the duplicate being given to the customer, the triplicate being retained at the division point, and the quadruplet remaining in the machine. The Sales Ticket is checked at the main office and costed. Invoices are prepared from the Sales Ticket, three copies of the invoice being sent to the customer who purchased the parts, provided they were on account.

Shop Records

In addition to the complete records described, several records originate in the shop itself. In the case of an engine overhaul a detailed "Inspection Record" is made. This consists of about six closely typed sheets describing the condition of the engine when repair was begun, replacements made, and other such details. Then the engine is turned to the test stand, where another "history" of the engine is made. During the six-hour tests, voluminous notes on its operation are made, in duplicate, one copy of which goes to the customer and one to the shop files.

In the case of an inter-company engine, upon completion of the overhaul, a three-part form is filled out in triplicate, the second copy of which goes to the general office, the third remaining in the local office. The original is separated into three parts, one of which goes to the operations office as a notice of overhaul on the engine. The second and third parts accompany the engine, the third sheet to be signed and returned as acknowledgement of receipt.

Purchasing Department

The purchasing department is designed to effect economies and insure efficiency in purchasing materials, both for the use of the company and for re-sale.

A requisition system is used. Two copies of the requisition are filled out by the department desiring the material, one of which is kept by that department for permanent files. Upon receipt of the original of the requisition, the purchasing department issues a purchase order consisting of eight copies. The original is sent to the vendor, a copy to the accounting room for permanent records, and four are kept in the purchasing department. Of these, one is filed in the numerical file, one in the alphabetical, one in the order tracing cabinet and one in a daily ledger from which daily summaries of purchases are made. Upon receipt of the material, the receiving department sends down the receiving copy of the "Purchase Order," which goes through the purchasing department into the accounting department to authorize payment of the bill. Vari-colored sheets facilitate these procedures.

A tracing file is maintained to secure prompt service from manufacturers and jobbers. A card is made out to cover each order and set, up to date upon which a reply could reasonably be expected. If an acknowledgement has not been received at that time, a letter is dispatched and the card again set up at an advanced date, when a tracer is again instituted. When the material is received the tracing copy of the Purchase Order is placed in the "Received" book and the card removed from the tracing cabinet and destroyed.

A price book that helps in watching fluctuations in price is also maintained. Each item has a card with the price listed and each purchase is entered thereon.

A daily invoice register is also kept, with all invoices upon a single day entered together. Invoices are received in triplicate, one of which is sent to the accounting department, one to the company or department ordering the ma-

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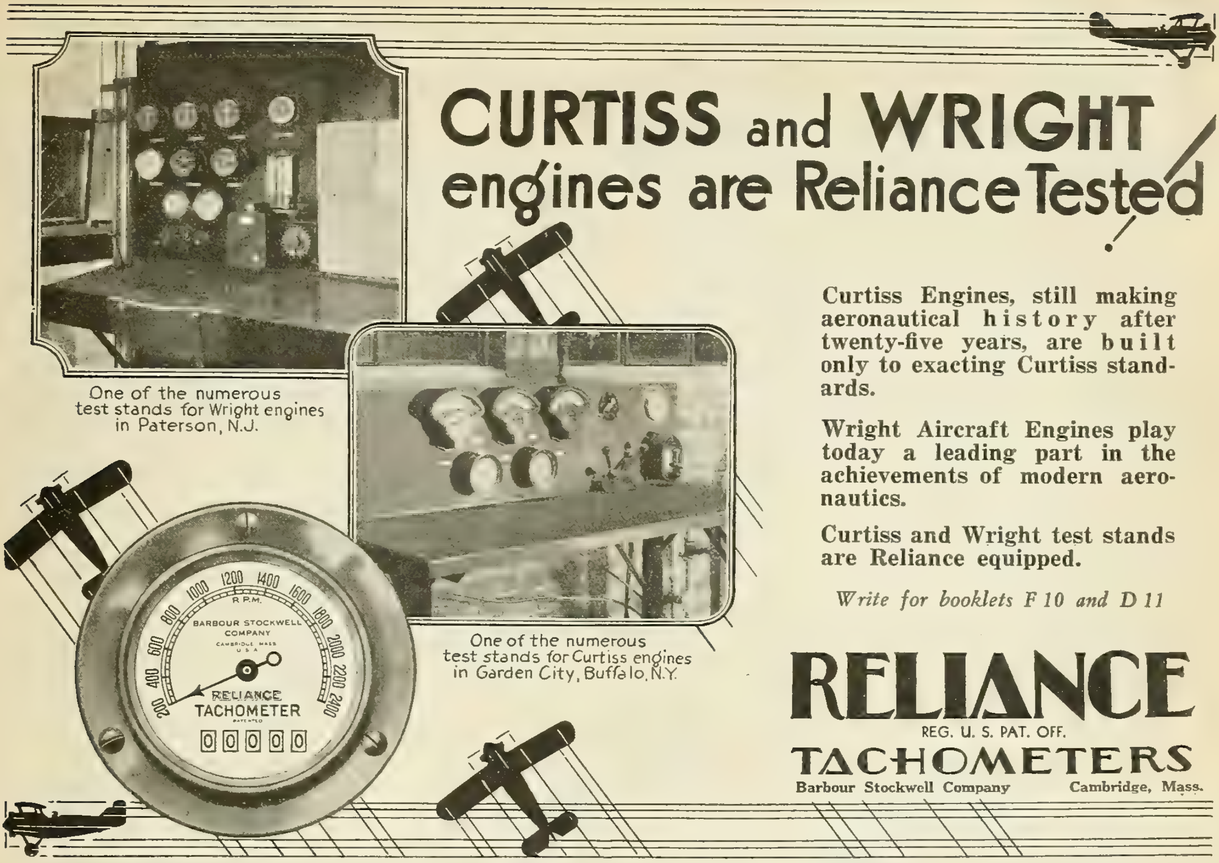

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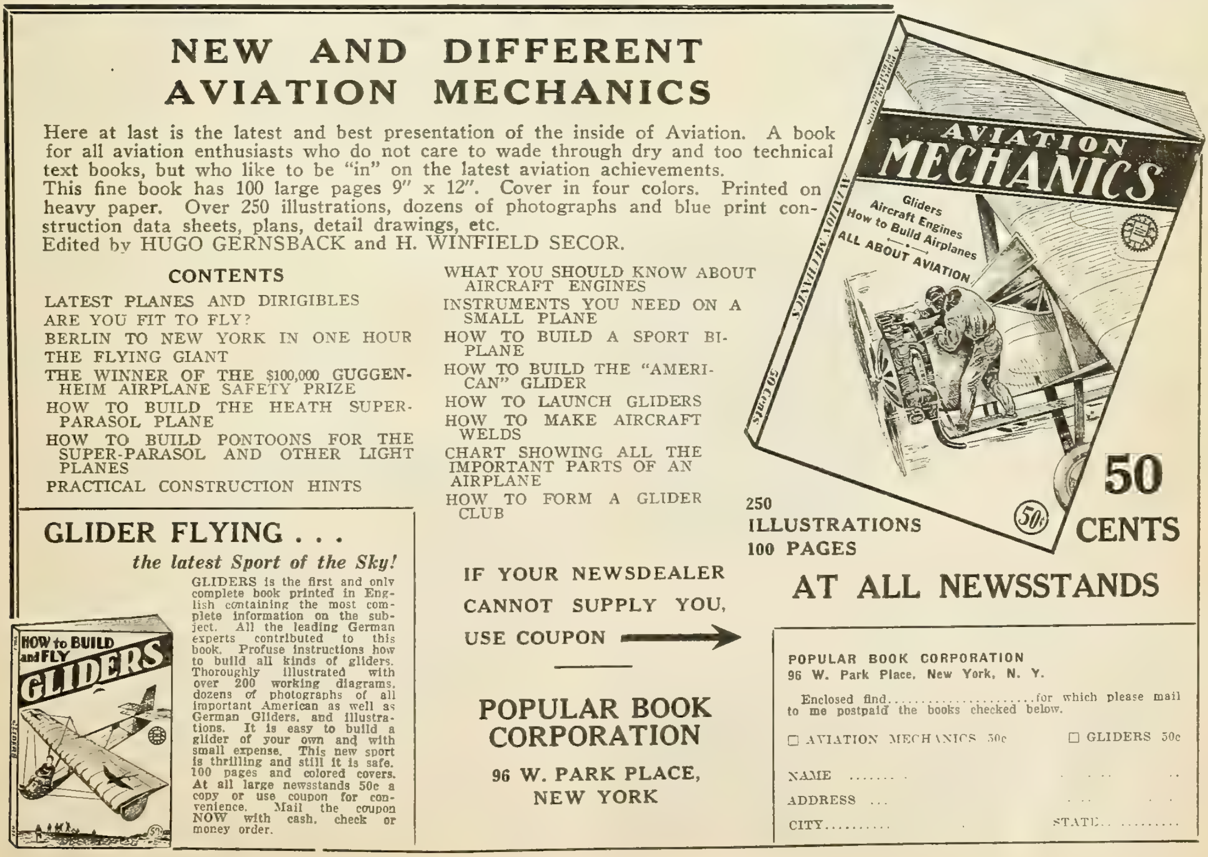

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DURATION FLIGHTS DURING 1929

(*Continued from page 65*)

cowboy and Reginald Robbins a former railroad mechanic. Experienced pilots at the time smiled to think that they were out to exceed the world record of the *Question Mark,* which had been piloted by experienced fliers and backed by the resources of the U. S. Army. Attending the *Fort Worth* was another Ryan plane, the *Midland,* which was piloted by K. K. Hoffman with H. S. Jones serving in the capacity of hoseman. In the refueling of the *Fort Worth,* the supply nozzle was allowed to empty into a funnel attached to the side of the ship rather than into one placed on top. In this way it was hoped to eliminate to a large extent the fire and asphyxiation hazards resulting from spilling or over-filling. A thirty-seven-foot hose could be lowered from the bottom of the *Midland* if necessary, but twenty feet was usually sufficient. Seventeen refuelings were made in all kinds of weather, at elevations that varied from 2,500 to 4,000 feet. The contacts lasted about eight minutes, during which time about 130 gallons of gas were transferred. For cruising purposes, the altitude maintained was usually 2,500 feet. Twice a day Jim Kelley cautiously crawled out on an eight-inch "cat-walk" in order to grease the rocker arms of the engine. At one of these times the buckle of his safety belt barely nicked the wooden propeller. The nick developed into a crack which enlarged during a rain-storm that was encountered a few days before the landing. After exceeding the record of the *Question Mark* by the required hour, it was thought that the pilots would be glad to land, especially so in view of the fact that the engine was vibrating badly because of the unbalance produced by a damaged propeller. However, they kept flying and later went through a severe electrical storm. When daylight came on Sunday the 26th of May, they had flown exactly one week. And still the flight was continued up until the vibration of the motor became so violent that it was decided to land then in safety, rather than continue and later chance a crash with a shattered propeller. And so the flight terminated after establishing what was then a remarkable world's duration record of 172 hours, thirty-two minutes, and one second. They had not only bettered the record of the three-motored *Question Mark* by nearly twenty-two hours, but what was more important they had stimulated public confidence in the reliability of single-engined ships even when operated under adverse conditions of weather.

On May 28th, Herbert J. Fahy took off in solo duration flight from Los Angeles, California, in a Lockheed Vega monoplane powered with a Wright Whirlwind engine of 225 horsepower. He took the air with 435 gallons of gas, nine gallons of oil, sandwiches, coffee and other necessary supplies, sufficient to last about forty hours. After circling the vicinity of the fields both day and night, he made a new unofficial record for solo duration flight. The barograph trace of this flight was one of the finest on record, being decidedly in contrast to the general run of traces, which during the past year especially have been exceedingly poor.

The fine, clean cut trace described every variation in altitude, indicating beyond the slightest question that no intermediate landing had been made during the flight. The duration time estabilshed in this flight was thirty-six hours, fifty-six minutes, and thirty-six seconds.

It may be well at this point to note the fact that directing officials sometimes forget, following the excitement of clocking a landing, to lift the barograph stylus from the recording drum of the instrument. If this is not attended to within a reasonable time after the finish of the flight, a trace will continue to be made giving the atmospheric pressure at the ground level until the barograph clockwork runs down. This extraneous trace frequently obscures or obliterates that part of the flight trace which shows flight near the ground level, including the trace for the take-off and the landing, and makes it difficult to check the duration time or to determine whether an intermediate landing has been made.

On June 28th, a third refueling flight was under way. At that time, Byron K. Newcomb and Roy L. Mitchell took off from the Cleveland Airport, Ohio, in the Stinson cabin monoplane *City of Cleveland,* which was powered with a Wright Whirlwind engine. This motor already had been run for 600 hours previous to the take-off. The ship was equipped with a most ingenious arrangement for greasing the rocker arms of the engine from the cabin. This consisted essentially of a set of eighteen tubes which led from the rocker arms of the engine to the instrument board of the ship. In addition, an auxiliary oil tank was arranged so that oil could be changed at regular intervals. When the pilots desired to refuel, they dropped notes to the field. The refueling ship, also a Stinson plane having a Wright engine, was piloted by Ernie Basham. At first all went well. The weather was fair, fuel and food were received regularly, and the engine functioned perfectly. At that time the pilots set their aim at the 200-hour mark. In fact, progress then was so good that they decided to stay up indefinitely. As time passed the air became very rough and refueling operations were found very difficult, especially so after oil had smeared over the wind-shield and obscured the vision. Sometime later, after getting practice with a signal cord that was attached to the arm of the pilot and operated by the hose man, they were able to make much better contacts. The refueling process, however, was not nearly so difficult as the grabbing of supply bags which at times would dangle evasively at the end of a rope. Contacts were usully made at the 2,000-foot level. The fuel consumption was approximately twelve gallons per hour with the engine turning over as low as 1,500 revolutions per minute. Weather conditions after the first night out became steadily worse. Towards the latter part of the flight when a big storm broke, rain came down in torrents and was accompanied by vivid lightning and thunder that could be heard above the roar of the motor. At this time the ship was flown most cautiously in small circles over the airport. At one time a trip to Medina and Akron were made with the hope of avoiding the thick of the storm but without success. During the most critical moments, Mitchell struggled at the controls endeavoring to keep the ship right side up. At any moment it was expected that the magnetos would cease functioning, but apparently the coating of grease protected them to an additional extent from the deluge. Upon noting the approach of this storm on Thursday evening (July 4th), they had decided to continue flight and fight it out because of the nearness to a world's record. On the morning following, the storm abated. The pilots then sorely felt the after effects of the fight. Their resistance now had been lowered considerably, and both at this time heartily abandoned the idea of remaining aloft any longer than necessary to establish a new record. In short, they were pretty well worn out by their venture in which they averaged only a few hours sleep each day and had had only one night of clear weather. During the rest of their flying time, unfortu-

(*Continued on next page*)

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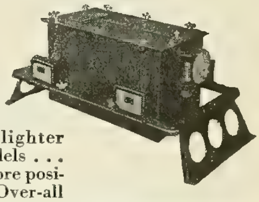

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(*Continued from preceding page*)

nately, it was cloudy, rainy, or stormy. At the moment of establishing a new record, signal flares were sent up from the airport. This must have been a welcome sight to the tired pilots who shortly afterwards landed the ship, establishing on July 6th a new duration record of 174 hours and fifty-nine seconds. It was indeed a most grueling grind for man, motor, and plane.

On July 2nd, Loren W. Mendell and Roland B. Reinhart took off in a fourth refueling flight from Culver City Airport, California, in the *Angeleno,* a Buhl Airsedan with a Whirlwind engine. As in the two former cases, the ship and engine were not new. Mendell and Reinhart flew continuously for many days and nights until a new world's record had been established. The weather during the flight was excellent, quite in contrast to that experienced in the stormy flight made by Newcomb and Mitchell. At all times the motor functioned well. Now and then the ship was flown down to within twenty feet of the airport, making a short visit to the folks on earth. This practice, at least as far as the barograph record is concerned, is not advisable; for it may appear on the chart as though a landing had been made. With this point in view, a duration flier does his best to remain whenever possible at least 500 feet above the take-off point. On the thirty-seventh refueling contact which was made at approximately 1,500 feet, something appeared to go wrong with the plane, and very soon afterwards it slipped suddenly to the field for a most unexpected landing on July 12th. On later inspection it was found that papers, rags and other waste material thrown from the plane while in flight had fouled the tail unit. In this flight a splendid world's duration record of 246 hours, forty-three minutes, and thirty-two seconds had been established. Except for the item of sleepiness, the pilots, after a medical examination, were found to be in remarkably good physical condition. They claimed they could have remained flying for a much longer period.

On July 13th at 7:17 a.m., Dale Jackson and Forest O'Brine took off from Lambert-St. Louis Field on a refueling test flight. They flew a Curtiss-Robin monoplane, the *St. Louis Robin,* which was powered by a Curtiss Challenger six-cylinder radial engine of 170 horsepower. The refueling ship, also a Curtiss Robin, was most capably piloted by C. R. Wassall assisted by P. V. Chaffee. The *St. Louis Robin* was a stock model, modified by substituting a 176-gallon gas tank and adding a six-inch "cat-walk" which led to the engine. Placed on top of the gas tank was a pneumatic cushion on which the co-pilot could sleep while off duty. The refueling plane had a control cockpit that was fitted with a glass bottom, permitting excellent visibility downward. The refueler's place was in an open cockpit behind the fuel tank. During the contacts the refueling plane would fly straight ahead of the endurance ship. The latter then would maneuver to one side and drop underneath the supply ship. The pilot in the upper ship could from his cockpit view the position of the plane below through the glass flooring of his compartment, A fuel hose one and one-half inches in diameter and forty feet long was lowered to the *St. Louis Robin* and caught by the hoseman in the aft cockpit. The oil supply was lowered in five-gallon tins. Although a forty-foot hose was let down, the air resistance of the hose was sufficient to produce a great loop so that only twenty-five feet would usually separate the two planes during contacts. When each hose connection was made, 120 gallons of gas were transferred which usually required a period of about four minutes. It was necessary during this critical time to have a fine sense of piloting in order to maintain the relative position of the two ships. The upper tended to rise, and the lower to sink as the transfer of gasoline progressed. Much credit, no doubt, was due to C. R. Wassall in the refueling ship for his skill in handling the controls. Contacts had been made in practice on previous occasions, hence these contacts were made without unforeseen difficulties.

The two pilots alternated in four-hour watches throughout the flight. They shaved daily, took sponge baths, and had plenty to eat and read. Since they were not especially active, two meals a day would usually suffice. The ship was easy to handle, oft times it could be flown for an extended time with hands off, using foot pressure on the rudder bar as the only needed control.

The weather in general remained fine. Daily trips were made on the "cat-walk" in order to inspect and adjust the engine. All working parts of the plane were carefully watched. One day some waste paper and rags thrown overboard caught on the tail unit of the ship. A requested fishpole was sent up to the pilots and the tail soon afterwards was cleared. Messages from the pilots were placed in an aluminum cylinder, six inches long by one inch in diameter, that had attached to it an attractive three-foot streamer. During periods of low flying, the message tube was dropped to the field headquarters. From time to time messages were released giving technical information about the performance of the engine—data such as oil pressure, temperature, engine speed and other notes of interest to engineers. In addition to merely circling the home port, trips were made to Scott Field and Parks Airport. The carburetor was adjusted while in flight to give maximum efficiency in fuel consumption. From time to time spark plugs would be changed by one of the pilots, who would get out on the six-inch cat-walk, while the other remained at the controls keeping the plane in steady, level flight. One gallon of gas was used for each ten miles flown, when cruising with the engine turning over at 1,350 revolutions per minute. On the 20th of July, the clockwork of the sealed barograph ran down. This instrument, unfortunately, could not be wound from the outside of the case, else the trace could have been made continuous. The pilots at this time were instructed by the N.A.A. official directing the trial to stay within the vicinity of the airport and in view of witnesses, now that the barograph drum no longer functioned. They also were instructed to keep an accurate air log and take good care of it especially during the excitement of landing. At one time it appeared that the duration flight must end soon. The motor, which usually ran perfectly, began to miss slightly. First the spark plugs were changed, but that did not remedy the trouble. Then the oil-soaked leads to the spark plugs were renewed, but still the trouble persisted. Next the magneto was thoroughly inspected and in the make-and-break contact compartment were found several strands of fine wire which were at length removed, but with considerable difficulty. The engine at once resumed its normal rhythm and the pilots continued their flight in good spirits. Some time later, during one of

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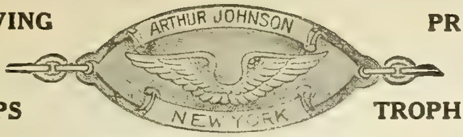

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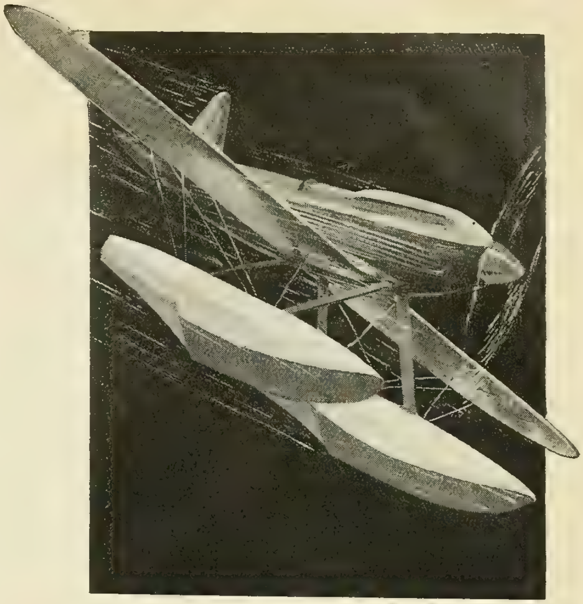

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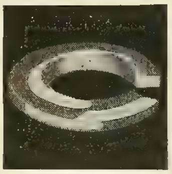

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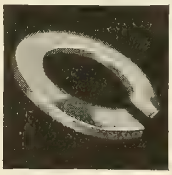

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(*Continued from preceding page*)

the food transfers, the food container accidentally hit the fuselage, tearing a small hole in the fabric. This trouble, however, was of a very minor nature and easily repaired by patching. On July 23rd, some oil coming from the push rods, spattered the windshield, which made it necessary to call for rags in order to clean the glass. Flying at an average speed of sixty miles per hour at an average altitude of 3,000 feet, they had consumed thus far, after forty-five contacts, about 2,150 gallons of gas and ninety-five gallons of oil. On the 12th day of flight, July 24th, the new world's refueling duration record was established. Nevertheless, the flight was continued. Having confidence in their engine and plane, and seeing that they were in fine condition physically, it was planned to prolong the flight to the 500-hour mark.

Then came an overcast sky with a light rainfall. A fog rolled in and for a time it was necessary to fly blind, relying on the use of the instruments. On rising to an altitude of 3,500 feet, however, it was found to be clear with starlight overhead, a circumstance that relieved the pilots greatly. The log book now had swollen to seventy-five pages. On Sunday, July 28th, the weather cleared and the engine still sounded as good as ever. The pilots felt in excellent condition and decided to put the record where it would stay for a long time. On July 29th, the seventeenth day of flight, they had remained aloft 391 hours, making in that time forty-four transfers of fuel. For a while now they cruised at 5,000 feet, coming to lower levels for fuel. During the afternoon seventy-five gallons of gas were requested, and just before night-fall 100 gallons of gas were taken aboard. The engine continued to perform in an excellent manner, turning over at 1,300 revolutions per minute. Up to this time, 3,320 gallons of gas had been consumed. The oil consumption now was somewhat greater than formerly as a result of leakage at the push rods. Storm clouds at times threatened, but happily they almost always cleared away. The flying weather during this long test had been most favorable. On July 30th, the eighteenth day, Major W. B. Robertson who was in charge of the flight, requested that the pilots come down and land the ship, because the engineering objects of the flight had been accomplished, with the performance of the plane exceeding all expectations. Complying with the request, the ship was landed towards evening, with the engine still functioning well. Thus Jackson and O'Brine established a new world's refueling record of 420 hours and seventeen minutes, which is equivalent to seventeen and one-half days or two and one-half weeks. During this time the ship had flown about 25,000 miles at an average speed of sixty miles per hour, had made forty-seven refueling contacts, and consumed 3,520 gallons of gasoline. The men at the end of the longest flight of all time were found to be in fine physical condition and in excellent spirits.

On July 28th, Mme. Maryse Bastie of France established at LeBourget Field, Paris, the world's first officially recognized duration record for women fliers. She piloted a Caudron monoplane powered with a Salmson forty-horsepower motor for a duration without refueling of twenty-six hours, forty-seven minutes, and thirty seconds.

On August 28th, the late T. G. Reid took off in a solo duration flight from Cleveland Airport, Ohio, in an Emsco landplane powered with a Wright Whirlwind engine of 225 horsepower. Starting off in the morning with fuel enough for fifty hours he continued his flight during day and night with the motor performing perfectly. After a long monotonous grind the former record of approximately thirty-seven hours exceeded, but not satisfied, the flier kept on. About two hours later, however, no longer able to overcome drowsiness in the darkness of midnight, made even worse by a light fog drifting in from the lake, he crashed into a large beech tree near Fairview Village and was instantly killed. Thus, unfortunately ended on August 29th, a flight of thirty-eight hours and forty minutes. The pilot, formerly a Navy flier of experience, had never had an accident until this time. This regretable accident illustrates most forcefully the danger of long solo flights, a competition that the National Aeronautic Association has tried to discourage for several years.

On October 2nd, Vern E. Speich, another solo duration flier, took off from Long Beach, California in a Zenith biplane equipped with a Wright Whirlwind engine of 225 horsepower. His flight progressed day and night with the motor running steadily. At the finish his flight time nearly duplicated that of the late T. G. Reid. Vern Speich landed the ship safely after establishing a solo duration of thirty-eight hours and forty-eight seconds. Many long solo duration flights, no doubt, have been stimulated by the ever famous one made across the Atlantic by Charles Lindbergh in 1927. Exceptional solo flights since that time and their durations are listed chronologically in the following table.

		Duration		
Date	Pilot	hrs.	min.	sec.
May 20-21, 1927	Charles Lindbergh	33	28	-
May 2- 3, 1928	Royal Thomas	35	25	8
Mar. 27-28, 1929	Martin Jensen	35	33	20
May 28-29, 1929	Herbert Fahy	36	56	36
Aug. 28-29, 1929	T. G. Reid	38	40	-
Oct. 2- 3, 1929	Vern Speich	38	0	48

On November 27th, after a previous unsucessful attempt, Miss Elinor Smith and Miss Evelyn Trout set out once again in an attempt to establish a refueling duration record. They took off from the Los Angeles Metropolitan Airport, California, in the biplane *Sunbeam* which was powered with a Wright J-6 air-cooled radial engine of 300 horsepower. The duration ship made its get-away with 190 gallons of fuel and cruised around San Fernando Valley and vicinity. The pilots took four-hour shifts at the controls, getting their rest as best they could on top of the gas tanks. The refueling ship, the *Pigeon,* delivered 185 gallons of gas during each contact of four minutes. The *Sunbeam* consumed about twenty gallons of gas an hour. On one occasion the refueling ship had serious trouble in delivering its load, and became necessary to press into supply service a Buhl airplane. Refueling operations under this strange ship were anything but pleasant, but what was even more disconcerting, the fuel delivered was not adequate to maintain the flight of the *Sunbeam* throughout the night. As a result, the duration ship was landed out-of-gas at 4:00 a.m. on November 29th, after remaining in the air for forty-two hours, four minutes, and forty-one seconds. The flight, although relatively short for refueling trials, was successful in establishing the world's first official refueling record for women.

The coming year may see a more practical use of the refueling attempts—such as transcontinental flights similar to that initiated by the *Spokane Sun God,* or those of a trans-

(*Continued on next page*)

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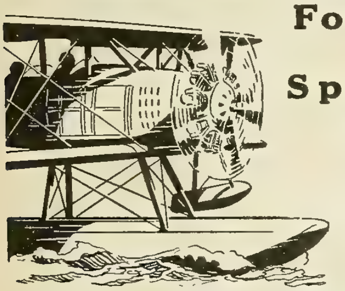

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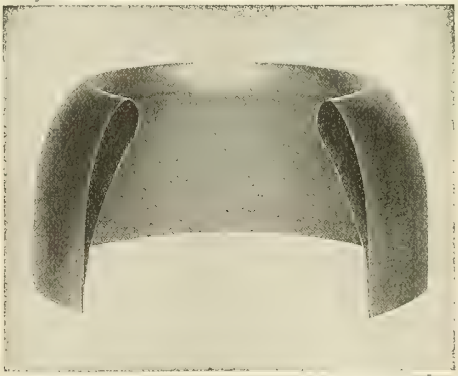

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(*Continued from preceding page*)

oceanic nature. For the latter type, fuel-loading to capacity while in flight provides a means of securing in safety a decided increase in potential mileage and eliminates the dangerous take-off of a heavily loaded airplane.

For ready reference, some of the important duration flights of 1929 have been classified and listed chronologically in the following summary:

Refueling Flights

Date (1929)	*Pilots*	*Duration* hrs.	min.	sec.
Jan. 1- 7	Army *Question Mark*	150	40	14
May 19-26	Robbins and Kelley	172	32	1
June 28-July 6	Newcomb & Mitchell	174	0	59
July 2-12	Mendell & Reinhart	246	43	32
July 13-30	*Jackson & O'Brine	420	17	0
Nov. 27-29	**Miss Smith & Miss Trout	42	4	41

All the above were official world's records at the time.

* *Present official world's record.*

** *Present official women's record.*

Solo Duration Flights

Date	*Pilot*	hrs.	min.	sec.
Jan. 2	Evelyn Trout	12	11	0
Jan. 30-31	Elinor Smith	13	16	45
Feb. 10-11	Evelyn Trout	17	5	37
Mar. 16-17	Louise McPhetridge	22	3	28
Mar. 27-28	Martin Jensen	35	33	20
Apr. 23-24	Elinor Smith	26	21	32
May 28-29	Herbert Fahy	36	56	36
July 27-28	*Mme. Bastie	26	47	30
Aug. 28-29	**T. G. Reid	38	40	—
Oct. 2-3	V. E. Speich	38	0	48

All the above were unofficial records except where noted.

* *Official women's record without refueling.*

** *Killed.*

Publication approved by the Director of the Bureau of Standards of the U.S. Department of Commerce.

TWO-WAY RADIO COMMUNICATION

(*Continued from page* 63)

practice, a pilot is able to carry on a running conversation with a ground station as rapidly as over an ordinary telephone wire.

In order to conserve the short-wave channels to the utmost, the Federal Radio Commission, in coöperation with the Department of Commerce and the transport operators, has worked out a system of allocation. Under this system certain groups of airways, consisting in most cases of an east-west or north-south trunk line, together with as many feeders thereto as possible, are assigned a group of channels; and all of the aircraft and ground stations on that "chain" work on the same wave-lengths.

The question has been asked many times why the transport operators could not use the Department of Commerce long-wave telephone stations instead of going to the expense of erecting short-wave transmitters at their own airports. The reason is that, although the Department might be able to carry on communication with all the planes which are at present equipped with radio, when all ships are thus equipped, and the number of schedules is even further increased, the long-wave stations would be so busy handling this type of traffic that they would not be able to fulfill their primary purpose of broadcasting weather information impartially for everybody. Under these circumstances, a duplicate network of stations appears to be thoroughly justified. Furthermore, the transport operators hesitate to delegate to any second party the responsibility for communicating with and directing the control of their planes. As long as there are sufficient channels available and they are economically used, there would be strenuous opposition to any other manner of operation.

In the event that two-way radio is desired by itinerant fliers, the Radio Commission has designated the wave-length of 97 meters (3,106 kc.) as the "National Calling Frequency," and any airplane will be licensed to use this wave-length. All ground stations, whether Government or private, will stand continuous watch on this frequency, and must answer any calls for assistance or weather information that may be requested. In order that small planes need only have a long-wave receiving set in addition to the transmitter to carry on two-way communication with the ground, the wave-length of 1,080 meters (278 kc.) has been set aside as the "National Airport Frequency" for the use of any airport or radio station which may make application for it. The power is limited to ten watts and the range to twenty-five miles for these transmitters in order to minimize interference between adjacent airports.

To summarize the plane of aircraft radio as it is today, the following services and systems are in operation or projected for the near future: The Department of Commerce has erected a series of radio telephone stations along the major airways of the country to broadcast local and general weather information at hourly and half-hourly periods. The courses of the major airways have been marked out by radio beacon stations which are also operated by the Department. All of the above stations transmit on long waves—between 600 and 1,200 meters (250 to 500 kc.). In addition, airports will be allowed to carry on communication with planes in their vicinity on a wave-length of 1,080 meters (278 kc.).

All airplanes, whether transport, taxi, itinerant or private, will be licensed to transmit on a wave-length of 97 meters (3,106 kc.), and communicate with airports or other radio stations which may be within range. With a transmitter and long-wave receiving set, it will be possible to receive all the services of the Department of Commerce, to carry on two-way conversation with these stations in case of emergency, and to talk with airports when within range.

Transport operators in scheduled operation will be permitted to install short-wave transmitting stations along their routes, using certain frequencies which have been set aside for this purpose. Their airplanes will normally use the same wave-length as the ground stations along the particular route they are flying, but in the event that they are temporarily on some other airway, the "National Calling Frequency" of 97 meters (3,106 kc.) may be used instead. All ground stations will listen on the latter channel and give all possible aid they can to passing aircraft. A taxi or itinerant plane may be equipped with a short-wave receiver, if it is so desired, and communicate directly with the short-wave ground stations of the transport operators when they are within range.

The second part of this article, appearing next month, will be devoted to some of the principles involved in the application of two-way communication to the established air transport systems in the United States, and also it will endeavor to show what radio can and cannot be expected to do in making air transportation safer and more reliable.

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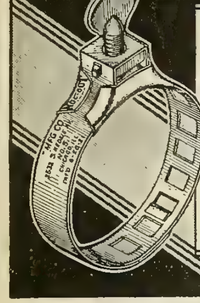

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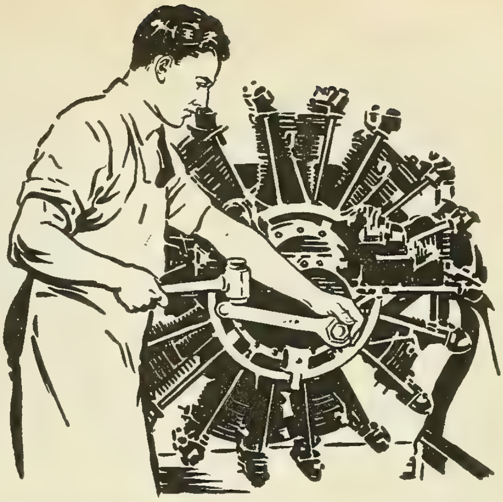

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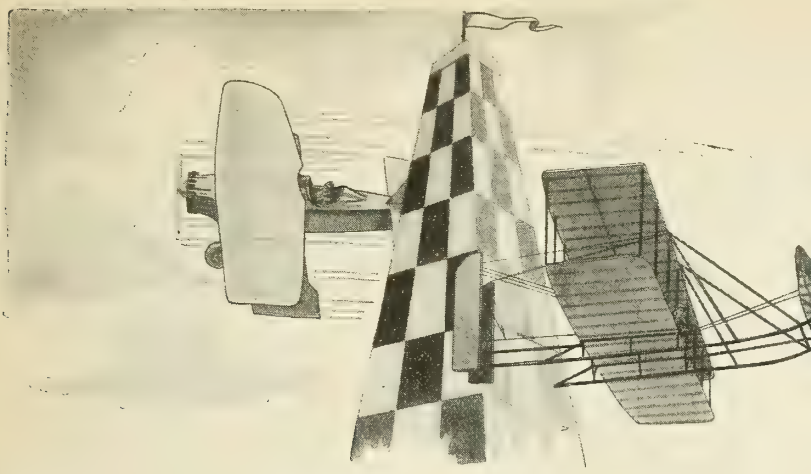

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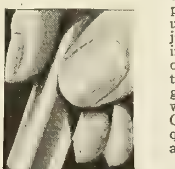

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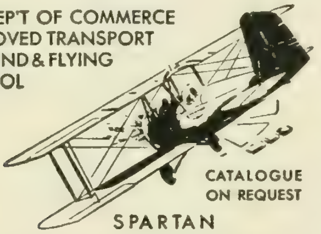

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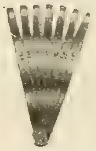

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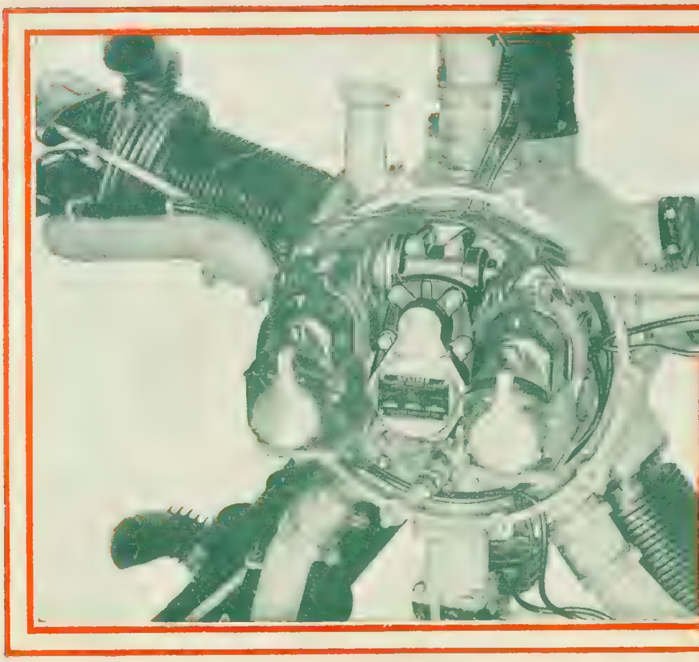

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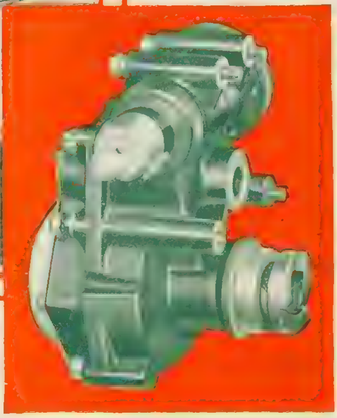

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The Type SH 4 Hand Turning Gear is built in response to a universal demand for an Eclipse Starter for Kinner K-5 engine application.

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